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DIABETIC MORTALITY IN AUSTRALIA.

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UNTIL now there has been no general review of the mortality statistics of diabetes for Australia over the period for which they are available. We have, therefore, summarized the official diabetic mortality statistics of Australia for the period 1908 to 1945. In a further article we propose to deal with the prevalence of diabetes in Australia and to give the results of a follow-up study on certain clinic and other classes of diabetics. One of us is also undertaking a general study of the Australian mortality over the same years, in which some of the points made in this paper will be amplified.

We shall first briefly describe the sources of our data, making mention of the principles of classification and coding of the death certificates, in so far as they affect the numbers of deaths classified as being due to diabetes. We shall then proceed to show that diabetes is one of the principal causes of death. We shall discuss the age-specific rates and the various methods of combining them in the form of standardized rates, so that comparisons can be made in which the effects of the changes in the age distribution of the population have been eliminated.

Sources of Data.

We have taken the deaths by age and sex from the annual bulletin *Demography*, published by the Bureau of Census and Statistics, Canberra, since 1906. The report on the 1921 census under Mr. C. H. Wickens (1927) contained a chapter entitled "Intercensal Demography", which summarized all the annual tables for the years 1911 to 1920, and which we have consulted rather than the corresponding volumes of *Demography*.

The Certification and Classification of the Deaths.

One of us will be giving in another paper details of the practice of classification and coding of the deaths; but it is necessary to give some description here of the practices, in order to explain the terms that occur later in the paper, and to describe the system of preferences by which deaths are assigned to diabetes when more than one cause of death appears on the death certificate. The death certificates of the various Australian States are now modelled on the certificate used in England and Wales, and ask for the primary cause leading up to death, and also give a space for other morbid processes, present at the time of death, which may have contributed to death. The English type of certificate was adopted by the different States at different times during the period under consideration. This difference in death certificates has, however, probably not greatly affected the comparisons between States. A copy of each death certificate is examined and an attempt is made to assign the cause of death to one of the rubrics (that is, categories) set out in the International List of the Causes of Death as determined by successive Commissions. For the guidance of the statistical officers, a manual has been prepared by the Bureau of the Census of the United States of America (1911, 1924, 1931, 1940), which not only gives the rubric to which individual diseases are to be assigned, but also in the case of multiple causes of death appearing on the death certificate gives the rubric to be preferred. Thus, the manual contains both an index of diagnostic terms and a system of "priorities" or preferences for joint causes of death when stated in the certificate. Since diabetes is a chronic

disease, this question is of some importance to us, as the system of priorities was designed for a slightly different form of death certificate, while the form of the English death certificate encourages the medical officer to give subsidiary causes of death. The American system of priorities gives a high priority to diabetes. Thus "diabetes" will be preferred to "coronary disease" or even the more definite "coronary occlusion". It will also be preferred to the rubric "gangrene", if the terms "gangrene" and "diabetes" both appear on the certificate. On the other hand, there are certain diseases which are preferred to diabetes. Thus cancer and tuberculosis, all forms of violence and the rarer specific infectious diseases will have a higher priority than diabetes. The mortality figures for diabetes will, therefore, be a minimum estimate of the number of persons who died "with diabetes". We should agree with Moriyama (1948), of the Bureau of the Census of the United States of America, that the mortality statistics give us the number of persons dying "with diabetes" but not necessarily "of diabetes" or its complications. Studies in the United States of America by Lombard and Joslin (1936), and by Joslin and Lombard (unpublished), cited by Joslin (1946), have also shown that only some 60% of known diabetics were finally coded to diabetes. It is probable that in Australia a similar position would be found if investigation were made.

TABLE I.

Diabetic Mortality in Australia. The Average Number of Deaths per Annum in Australia from Diabetes for Certain Periods.

Period.	Average Number of Diabetic Deaths per Annum.		
	Males.	Females.	Persons.
1908–1910	187	307	494
1911–1920	233	289	522
1921–1930	285	429	714
1931–1940	401	704	1105
1941–1945	470	916	1386

Total Diabetic Deaths in Australia.

We have not thought this the place to give detailed tables of the diabetic deaths by age and sex in Australia. Table I sets out the average annual number of diabetic deaths in Australia for the five periods we have studied. It is seen that the number has risen threefold for females and somewhat less for males, over the period from 1908 to 1945. This rise does not necessarily mean that diabetes is an increasing menace, and we shall try to show later that the increase is partly due to increase in the total population and partly to aging of the population, but also to an increase in the age-specific rates for females.

In Table II we emphasize the importance of diabetes as an individual cause of death; for we find that for females in the age-group forty-five to seventy-four years it is responsible for over 4% of the deaths in the most recent period (1941 to 1945). At every age for females it is also increasing in relative importance compared with all other causes of death—that is, the mortality from diabetes is falling less rapidly than that from all other causes. The relative increase in diabetic mortality for males is less pronounced. When the deaths at all ages are pooled to give the crude death rates, there is a pronounced rise in the relative importance of diabetes to all other causes from 1908 to 1945; but as we shall show later, aging of the population exaggerates the trend of mortality rates in the females and accounts for all the increase in the males.

The Age-Specific Death Rates from Diabetes.

Comparisons are best made on the rates for persons of the same sex and age. Table III gives the age-specific rates, obtained by dividing the numbers of diabetic deaths by suitable divisors. These divisors have been obtained by the summation of the mean population of each age group for each year, to give the total number of years of life lived in the period by persons of the given age and sex. It can be seen that the rates are approximately of the same magnitude for both sexes up to the age of forty-five years, but for the age group forty-five to fifty-four years and upwards females have higher diabetic mortality rates. At every period, for example, the rates of females at ages sixty-five to seventy-four years are almost twice those of males. We display these rates for three periods graphically in Figures IA and IB. In Figures IIA and IIB we trace the mortality of persons of a given age group over the period studied. We may summarize the findings on the age-specific rates as follows:

1. At the lower ages the rates are low for both sexes.

2. In both sexes, there is a rapid increase of the rates after the age of approximately forty-five years.

3. At the lower ages the sexes have rates of the same order; but after the age of forty-five years the female rate is 50% to 100% higher than the male rate.

4. If we follow the age-specific rate for a given age group—say females aged twenty-five to thirty-four years—we do not find any sudden fall with the introduction of insulin in 1923. In both England and Wales and the United States, however, the rates at this age—and, indeed, in all the lower age groups—showed a pronounced decline. In the decade 1931 to 1940, however, there is noticeably a decline in the Australian rates at the lower ages. The lack of reduction observed in the mortality rates of young diabetics during the years immediately following the introduction of insulin to this country probably admits of only one explanation—namely, the sobering fact that insulin therapy at that stage in Australia was inefficient. It must be admitted, of course, that the sudden availability of insulin would not do anything for young diabetics with advanced arterial degeneration, and the inadequate doses used for the care of diabetic coma in those days would not save many patients severely affected.

5. At the higher ages there have been rises, moderate in the case of males and considerable in the case of females. The female rates at ages sixty-five to seventy-four years have risen approximately 70% between the period 1908 to 1910 and 1941 to 1945. Corresponding

TABLE II.

Diabetic Mortality in Australia. The Diabetic Death Rate Expressed as a Percentage of the Death Rate from all Causes, for the Two Sexes, Grouped in Broad Age Groupings.

Period.	Sex.	Percentage of Deaths Due to Diabetes in Age Groups. (Years.)					
		0 to 4.	5 to 14.	15 to 44.	45 to 74.	75 and Upward.	All Ages.
1908–1910	M.	0·04	1·04	0·90	1·17	0·40	0·72
1911–1920	M.	0·04	1·10	1·00	1·13	0·53	0·76
1921–1930	M.	0·08	1·25	0·88	1·29	0·64	0·89
1931–1940	M.	0·07	1·11	0·76	1·48	1·08	1·13
1941–1945	M.	0·06	0·72	1·38	1·75	0·50	1·19
1908–1910	F.	0·01	1·28	0·78	2·30	0·79	1·07
1911–1920	F.	0·05	1·51	0·98	1·26	0·84	1·28
1921–1930	F.	0·08	1·74	1·14	3·16	1·14	1·76
1931–1940	F.	0·06	1·29	1·14	3·94	2·01	2·54
1941–1945	F.	0·07	1·29	1·38	4·22	2·16	2·81

TABLE III.

Diabetic Mortality in Australia: The Death Rate from Diabetes per Annum per Million of Persons at Risk.

Period.	Sex.	Death Rate in Age Groups. (Years.)									
		0 to 4.	5 to 14.	15 to 24.	25 to 34.	35 to 44.	45 to 54.	55 to 64.	65 to 74.	75 and Onward.	All Ages.
1908–1910	M.	11	21	26	45	78	139	470	722	657	91
1911–1920	M.	10	22	35	49	71	132	306	634	818	93
1921–1930	M.	14	19	26	31	44	115	316	647	862	93
1931–1940	M.	9	14	14	18	39	92	335	838	1435	117
1941–1945	M.	7	9	12	14	69	159	415	871	703	129
1908–1910	F.	0	22	22	28	62	145	549	1002	948	100
1911–1920	F.	10	26	26	42	62	179	529	1065	1084	119
1921–1930	F.	11	21	30	34	72	171	545	1266	1339	146
1931–1940	F.	6	12	22	21	51	172	628	1579	2266	211
1941–1945	F.	7	10	21	27	42	160	639	1757	2529	254

increases for females aged over seventy-five years have been 150% and for males aged sixty-five to seventy-four years 20%; for males aged over seventy-five years there has been only a slight increase (approximately 10%).

The Crude and Standardized Death Rates.

It is a common practice to give the crude death rates from all causes and from certain specific causes. This has the advantage of giving what is occurring in an actual population, but renders difficult comparison within the same country at different periods and still more so any comparison with other countries which may differ in age composition. The crude rates, however, do give a measure of the load which a community is bearing at any given time. We have set out in Table IV the crude death rates for Australia from all causes, and also the corresponding rates from diabetes. We notice for both sexes that the crude rates from all causes have fallen, but the diabetic rates have tended to increase. However, when we have corrected, for the changing age distribution of the Australian population by means of "standardization", on either the census population of England and Wales for 1901 or the life table population derived from the data of the 1933 Australian census, we find that the standardized male diabetic rates have not risen. On the other hand, all three of the female diabetic rates, crude and standardized, have risen—the crude rate from 0·10 per 1000 to 0·25 per 1000. Although standardization removes the effect of the aging of the general population, the standardized rates for females have risen by 40%, if the population of England and Wales in 1901 is used, and by 75% if the life-table population is employed. The life-table population gives more weight to the rates among persons of advanced ages than the population of England and Wales of 1901, which contained an abnormally high number of children, as England and Wales had just passed through a period of very high birth rate. With the cessation of the era of high birth rates the population of the western European countries and their extensions overseas are all tending towards the form or age-distribution of the life-table populations.

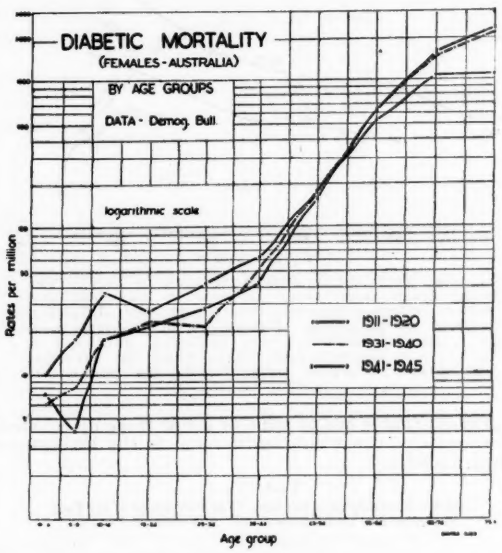

FIGURE IA.

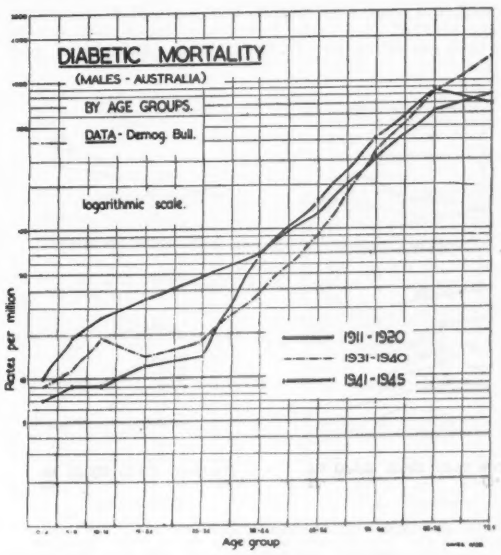

FIGURE IB.

Diabetes mortality in Australia, 1908 to 1945. A comparison of the age-specific mortality rates from diabetes in Australia for three representative periods. Semilogarithmic grid. A, male; B, female.

In Table V we set out the proportion of the total mortality due to diabetes of the various periods, to the mortality from all causes as measured in a life-table population. The two most recent periods are of the most interest, and show that about 1·2% of the male population and almost 3% of the female population will die with diabetes, if the rate of diabetes mortality remains at the level of the 1931 to 1940 or 1941 to 1945 periods and the mortality due to all other causes does not change greatly.

The Sex Distribution of Diabetes.

A curious change has been noted in many countries of the world in the sex ratio of diabetic deaths (Stocks,

TABLE IV.

Diabetic Mortality in Australia. The Standardized Rates for Mortality from All Causes in the Australian Population for Both Sexes, and the Corresponding Rates for Diabetic Mortality.

Period.	Sex.	Death Rates per 1000 *per Annum*.					
		Unstandardized.		Standardized.			
				England and Wales, 1901.		Australian L.T. Pop.[1] A^{M33} or A^{F33}.	
		All Causes.	Diabetes.	All Causes.	Diabetes.	All Causes.	Diabetes.
1908–1910	M.	11·8	0·09	11·5	0·10	19·5	0·18
1911–1920	M.	12·1	0·09	11·6	0·09	19·2	0·16
1921–1930	M.	10·4	0·09	9·5	0·08	16·2	0·15
1931–1940	M.	10·3	0·12	8·3	0·08	15·5	0·19
1941–1945	M.	10·9	0·13	7·9	0·09	15·5	0·18
1908–1910	F.	9·4	0·10	10·0	0·12	17·5	0·24
1911–1920	F.	9·3	0·11	9·8	0·13	17·5	0·26
1921–1930	F.	8·3	0·15	8·2	0·14	15·3	0·29
1931–1940	F.	8·3	0·21	7·1	0·16	14·1	0·38
1941–1945	F.	9·0	0·25	6·7	0·17	14·0	0·41

[1] L.T. Pop. A^{M33} or A^{F33} = the life-table population constructed from the data of Australian census of 1933 on male or female mortality.

1944). We give in Table VI the changes in the proportion of male to female deaths when standardization is applied to our life-table population. It will be seen that at 1908 to 1910 rates the ratio of male to female deaths would have been 0·74, but that this ratio has declined to a present value of 0·44. Even more pronounced changes have occurred in the European populations, in which the ratio has been studied for periods as far back as 1860. Thus, in England and Wales, Stocks (1944), using the population of England and Wales (1901) as his basis of standardization, reports that the ratio has fallen from 2·05 in the 1861 to 1870 period to 1·18 in the 1911 to 1920 period, and

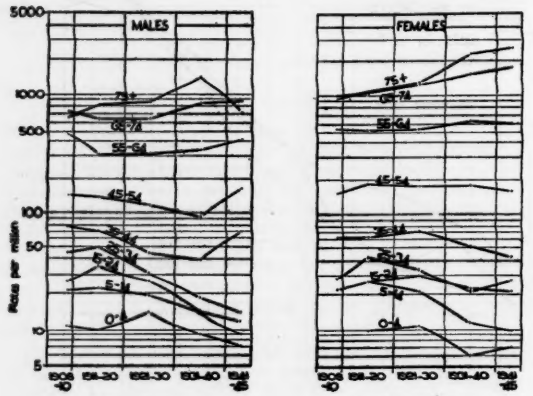

FIGURE IIA. FIGURE IIB.

Diabetic mortality in Australia, 1908 to 1945. A comparison of the age-specific mortality rates from diabetes as rates per million *per annum* for the five periods studied. Semi-logarithmic grid. A, male; B, female.

0·83 in the 1940 to 1941 period. Stocks quotes similar findings from Scotland, from the United States of America, from the Netherlands, from Sweden and from New Zealand; thus the change in the sex ratio is a phenomenon common to many countries of the western world. The possible factors to be considered in this remarkable rise in the diabetic mortality over the age of forty-five years are numerous, and some of them are probably acting with greater force in the more recent periods than they were in the earlier periods. Factors especially to be considered are the rearrangement of the pituitary hormones at pregnancy and at the menopause; and after the menopause a lessened degree of physical activity in the female; the improved economic status of the family which allows the purchase of the more expensive fat diet; obesity; the fact that obstetric developments bring the females of these age groups under closer medical scrutiny. The survival of an individual, genetically predisposed to diabetes, to these

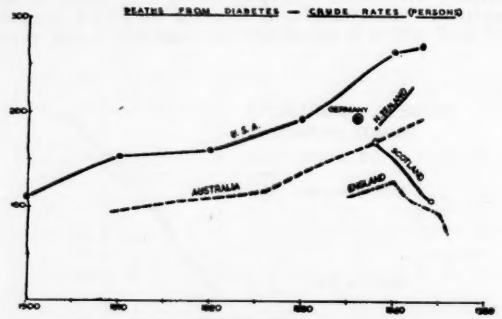

FIGURE III.

Diabetic mortality in Australia, 1908 to 1945. The crude death rates from diabetes in Australia and certain other countries, illustrating the difference between the behaviour of the rates in countries such as Australia, without severe rationing, and that of the rates in England and Wales, where the rationing was severe. Vertical scale: Deaths *per annum* per million at risk.

age groups exposes her to some or all of these diabetogenic mechanisms, with a resulting increase in the incidence of clinical diabetes.

TABLE V.

Diabetic Mortality in Australia. The Percentage of the Total Mortality due to Diabetes in the Life-table Population.

Period.	Ratio of Diabetic Mortality to Total Mortality Expressed as a Percentage.	
	Males.	Females.
1908–1910 ..	0·92	1·38
1911–1920 ..	0·83	1·48
1921–1930 ..	0·95	1·91
1931–1940 ..	1·20	2·66
1941–1945 ..	1·15	2·89

Race.

Australian vital statistics do not include the mortality of the aborigines. The Jewish race has been most studied from the point of view of diabetic mortality in other

countries. However, from the figures of the 1933 census report, we have set out in Table VII the age distribution of those returned as Jewish by religion. These figures unquestionably underestimate the Jewish proportion of our population; but the underestimation would have to be very gross indeed for this racial factor to be of importance in explaining the high ranking of the Australian population among the peoples of the world as regards diabetes mortality.

TABLE VI.

Diabetic Mortality in Australia. The Ratio of Male to Female Mortality in the Life-table Population. (Based on the Australian 1933 Life Tables.)

Period.	Ratio.
1908–1910..	0·74
1911–1920..	0·62
1921–1930..	0·52
1931–1940..	0·49
1941–1945..	0·44

Diabetic Potentiality.

It is of interest from the eugenic and genetic points of view to try to determine the number of potential diabetics in the population, so that the gene frequencies may be estimated on any given theory of the heredity of the disease. It is to be noted that the standardized rate of mortality in the life-table population gives us a measure of how many persons would die from diabetes if they were exposed to the diabetic rates of the actual population and the total death rates of the standard population. Some of the population will thereby be imagined to die before they are able to exhibit their potentialities—for example, the infantile deaths—so that this measure of potentialities is a minimum rate. We note in Table V that in the period from 1941 to 1945 the rates of mortality suggested that 2·89% of females would eventually die with diabetes. It is known that not all those who have the diabetic genes will exhibit diabetes. So there is, therefore, reason to expect a much higher true rate for potential diabetics than that derived from the table. It is now commonly believed that diabetes is carried as a recessive, and so the gene frequency will be greater than $\sqrt{0{\cdot}0289}$ or 0·17. The estimated number of heterozygotes would then be over 28% of the population. So that a minimum proportion of carriers of the diabetic genes, given as the sum of the homozygotes and the heterozygotes, is 30% of the entire population.

TABLE VII.

Diabetic Mortality in Australia. The Population of Australia, Jewish by Religion, at the 1933 Census.

Age Group. (Years.)	Males.	Females.	Persons.
0 to 14	2,506	2,327	4,833
15 to 44	5,953	5,728	11,481
45 to 74	3,490	3,069	6,559
75 and over	184	185	369
Unstated	50	61	111
Total	12,183	11,370	23,533

A Comparison of the Australian Mortality with Overseas Mortality.

Bearing in mind that no studies comparable to those of the United States or of England and Wales into the accuracy of the death certification and coding have been undertaken, we find that the Australian age-specific death rates from diabetes rank high among the countries of the world and are similar to those of countries enjoying an equal level of economic prosperity. Thus, in Table XIII of Joslin's text-book (1946), we find that the crude diabetic death rate of Australia (208 per 1,000,000 *per annum*) is exceeded only by those of the United States of America and of New Zealand (271 and 228 per 1,000,000 *per annum* respectively). Canada (193 per 1,000,000), Belgium (191 per 1,000,000) and Denmark (191 per 1,000,000) follow closely, whereas the rate for Sweden is only 68 per 1,000,000. There are so many factors involved that it is hard to give an explanation of the divergencies between countries (Joslin, 1940).

The influence of the two world wars on prevalence and mortality has been striking in those countries where food rationing has been most severe. This effect has been mediated by a reduction in the consumption of total Calories, and in those supplied by fat, rather than by a reduction in those supplied by carbohydrates. For example, sugar rationing has not necessarily reduced the intake of total carbohydrates.

In Table VIII, we have compared the age-specific rates in Australia with certain other countries for various periods. In doing so, we think it advisable to stress two points. Firstly, the system of routine urine examination of all new patients is strongly inculcated by all Australian medical schools, and the impression appears justified that of patients actually consulting a doctor, a lower proportion

TABLE VIII.

Diabetic Mortality in Australia: A Comparative Table of Diabetic Death Rates per Million of Population by Age and Sex for Certain Overseas Countries.

Country.	Period.	Sex.	Diabetic Death Rate by Age Groups. (Years.)										
			0 to 4.	5 to 14.	15 to 24.	25 to 34.	35 to 44.	45 to 54.	55 to 64.	65 to 74.	75 to 84.	85 and Upward.	All Ages.
United States of America.	1910	Persons.	24	38	46	51	83	237	650	1045	1120	741	153[1]
	1925	Persons.	13	21	29	34	70	231	698	1306	1616	1244	168[1]
	1940	Persons.	8	14	24	28	67	250	872	1893	2746	2144	266[1]
United States of America (coloured)	1926–1930	M.	—	—	—	48	84	272	543	867	—	—	—
	1926–1930	F.	—	—	—	67	224	639	1141	1440	—	—	—
England and Wales	1861–1870	M.	—	—	—	44	55	83	136	181	121	—	43[2]
	1901–1910	M.	—	—	—	59	78	160	415	731	720	—	104[2]
	1936–1939	M.	—	—	—	23	33	89	330	946	1589	—	94[2]
	1945–1947	M.	2	6	9	12	19	39	106	345	618	—	—
	1861–1870	F.	—	—	—	22	30	37	58	62	38	—	21[2]
	1901–1910	F.	—	—	—	51	63	120	357	574	473	—	84[2]
	1936–1939	F.	—	—	—	22	38	122	481	1289	1575	—	119[2]
	1945–1947	F.	1	5	12	15	24	53	207	594	728	—	—
New Zealand ..	1926–1930	M.	—	—	—	26	27	111	285	780	1582	—	106
	1926–1930	F.	—	—	—	37	45	205	514	1591	1904	—	164
Denmark	1926–1930	M.	—	—	—	—	—	131	426	802	838	—	118
	1926–1930	F.	—	—	—	—	—	127	527	1010	1070	—	150

[1] Unstandardized.
[2] Standardized onto the 1901 census population of England and Wales, Stocks (1944).

of diabetics would be missed by Australian medical practitioners than by practitioners in Great Britain. Secondly, much of outback Australia would correspond to Arizona, where Joslin (1940) found, during a survey directed to this point, that the incidence of diabetes was equivalent to that of the more closely settled areas of America, although the answers to questions addressed to practitioners and the published statistics from that State had suggested an unusually low incidence of diabetes.

Summary.

1. The existing system of coding and classification of diabetic deaths expresses a minimum death rate.

2. Death rates for diabetes in Australia have been computed from figures consolidated over certain periods of the years 1908 to 1945, for age-specific and sex-specific groups.

3. These rates reveal that diabetes is of increasing importance as a cause of death, particularly among the older females.

4. The age and sex distribution of the diabetic mortality has been described.

5. There was a lag after 1923 in the reduction in mortality from diabetes in the lower age groups following the introduction of insulin. A fall in the lower age groups was apparent in the decade 1931 to 1940.

6. Standardized rates of mortality from diabetes have been given. They reveal that little change has occurred in the male mortality, but a pronounced increase has occurred in the female standardized death rates from diabetes.

7. At existing rates of mortality about 1·15% of males and 2·89% of females will die with diabetes.

8. As in many other countries, the ratio of male to female mortality has fallen considerably, even when standardized rates are used.

9. The importance of the Jewish stock in Australia with regard to diabetic mortality would appear to be slight.

10. On one theory of heredity, it is suggested that at least 30% of the Australian population carry a diabetic gene.

11. According to this inquiry, diabetic mortality in Australia ranks high among those of the countries of the world, being exceeded only by those of the United States of America and New Zealand.

Acknowledgements.

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CHEMOTHERAPY OF NEOPLASTIC DISEASES AND BLOOD DYSCRASIAS.[1]

By A. W. MORROW,
Sydney.

DESPITE the great advances in our ability to diagnose neoplastic changes in an early stage, and the improved radiological and surgical therapy of neoplastic disease, it would still seem that only some 20% of patients afflicted with malignant disease will survive for five years. In blood dyscrasias the picture is equally depressing.

Since the turn of the century there has been intense activity in the field of chemotherapy in the hope that by this means a more efficient and a simpler method might become available.

Bacterial Extracts.

In 1868 Busch described the dramatic regression of inoperable sarcomata in two patients suffering from erysipelas. This observation commenced a series of extensive investigations into the tumour action of bacterial filtration products. Coley (1891), who became its chief advocate, treated malignant disease in this manner from 1891 until his death in 1935, but now it has fallen into disrepute. However, there is no doubt that profound alterations in malignant cells may be induced by some of these preparations, and it is possible that further fractionation may reveal active carcinolytic agents.

Antireticular Cytotoxic Serum.

A somewhat different approach to this problem came from the well known observation that splenic metastases are rare. This led to a premise, probably incorrect, that the cells of the reticulo-endothelial system elaborate some principle which possesses inhibiting or destructive effects upon neoplastic cells. Metchnikoff and his student Bogolomets subsequently developed a cytoxic serum prepared by inoculating horses with spleen and bone-marrow tissue obtained from human cadavers. The object was to stimulate the cells of the reticulo-endothelial system by the use of small doses of this so-called anti-reticular cytotoxic serum. This work has been carried out in the Union of Soviet Socialist Republics, but Davis (1947) in America has not reported favourably upon it.

Folic Acid Conjugates and Analogues.

When Fildes and Woods, in 1940, demonstrated that the administration of sulphonamides starved susceptible bacteria of para-amino-benzoic acid essential to their metabolism, this immediately suggested that analogues of known growth factors or essential metabolites might prevent or slow down the growth of organisms or cells. Progress in the field of infection with the application of this hypothesis has not been so satisfactory as might have been anticipated, mainly because such analogues interfere with the same fundamental process in host and parasite. However, in the field of malignant disease, Little (1948) showed that the Rous sarcoma could be prevented in baby chickens if they were fed on a folic-acid deficient diet. The next step was to feed the chickens on normal diets together with folic acid analogues. Such a substance, amino-pteroylaspartic acid, reduced the tumour rate to 40%. "Teropterin", which is pteroyltriglutamic acid, and "Diopterin", which is pteroyldiglutamic acid, were investigated by the Council of Pharmacy and Chemistry of the American Medical Association (1948) after many startling claims had been made concerning their ability to control malignant disease. The council reported that these drugs did not significantly alter the course of malignant disease in man, although relief of pain and subjective improvement were noted in some 50% of patients.

Both Farber (1948) and Dameshek (1948) have reported more favourably on the use of certain analogues, in

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on November 24, 1949.

particular 4-amino-pteroylglutamic acid ("Aminopterin") in acute leuchæmia. In some cases they have produced sufficient clinical and hæmatological improvement to regard the result as a remission. As far as can be determined, these remissions have been short-lived. The drug unfortunately is apt to cause severe toxic reactions, such as ulceration of the gums and intestine, alopecia, and depression of the bone marrow. At this stage, as a result of their observations it would seem reasonable to state that a chemotherapeutic agent is available which in some cases may alter temporarily the rapid downhill course of acute leuchæmia. Similar compounds with the same effect are 4-amino-N-methyl-pteroylglutamic acid ("a-Methopterin") and 4-amino-pteroylaspartic acid ("Amino-an-fol"). Farber and his colleagues have tried further analogues and their results now appear more hopeful. "Aminopterin" has been used at the Royal Alexandra Hospital for Children under the direction of Professor Lorimer Dods. Although a temporary remission was produced in one child, the results have been unsatisfactory. Professor Dods has given 0·5 to 1·0 milligrammes per day parenterally until a remission or toxic manifestations occurred. Unfortunately the complication of severe stomatitis and ulceration of the intestine is almost a constant finding. Whilst temporary remission may be produced in chronic leuchæmia and the lymphomata, other substances less toxic are preferred.

The Diamidines.

Snapper has made a somewhat different approach to the subject. Whilst studying the problem of multiple myeloma he noted that Warrington Yorke (1940) and his co-workers who were investigating the effects of the aromatic diamidines on certain protozoal infections reported a decrease in the elevated plasma globulin level in leishmaniasis. As an elevated serum globulin level is found very commonly in multiple myeloma, he tried the effect of stilbamidine in this malady. The results of this therapy have been reported from various centres (Snapper, 1947) in England and America. At the best one can say only that the disease is halted temporarily. However, bone pain, which is often excrutiating, may be completely or partially alleviated by such therapy. Neither the hyperglobulinanæmia nor the Bence-Jones proteinuria is affected. The results are unpredictable. Our experience at the Royal Prince Alfred Hospital has not been impressive.

An important point during therapy is that the patient should be maintained on a diet of low protein content. There is no adequate explanation for this requirement. Toxic effects are not uncommon, including a late toxic degeneration of the sensory nucleus of the fifth cranial nerve. Treatment is by parenteral injection of 150 milligrammes per day or on alternate days and must often be continued for a period of six weeks or more. Other neoplastic diseases, such as carcinoma and Hodgkin's disease, are unaffected.

One interesting feature of this therapy has been Snapper's observation that inclusion bodies appear within the myeloma cells during treatment; these are probably stilbamidine-ribose nucleate complexes. Thus it would seem that stilbamidine does become localized in myeloma tissues.

Urethane.

In their screening programme for carcinolytic agents, Haddow and Sexton (1946) investigated the carbamic esters, and no doubt as the result of this work Paterson (Paterson, Haddow *et alii*, 1946) commenced her clinical investigation into the effects of urethane in man.

In the beginning patients with advanced malignant disease were treated, with the most disappointing results. However, the depression of leucocyte formation which was observed led to a trial of the method in leuchæmia. As a result of Paterson's observations it may be accepted that whilst acute leuchæmia remains unaffected, at least some response may be anticipated in the chronic forms of the disease. Myelogenous leuchæmia responds more readily than the lymphatic form. Ian Collins (1949) has reported unfavourably on the use of urethane in advanced chronic leuchæmia; but in the treatment of two patients of my own who were suffering from chronic myeloid leuchæmia the results have been satisfactory.

The dosage was based on the recommendations of Watkins *et alii* (1948) of the Mayo Clinic—namely, three grammes given orally per day until the leucocyte count commences to fall, and thence a maintenance dose of 0·5 to 1·0 gramme per day whilst the leucocyte count is about 20,000 per cubic millimetre. Watkins points out that the primary fall usually commences within seven to fourteen days, and that a satisfactory response is evident within three to ten weeks; it consists in a pronounced fall in the leucocyte count, relief of the anæmia, and regression of splenomegaly and lymphadenopathy.

It is probable that the response to conventional X-ray therapy is more reliable.

Nitrogen Mustard.

Some thirty-two years ago the Germans first used mustard gas in warfare. Amongst the seriously ill and fatally affected casualties a finding of leucopenia and depression of bone-marrow function was noted, but its therapeutic significance was not appreciated.

The nitrogen mustards were a development of World War II, but fortunately were not required. The formula of the original mustard gas was:

$$\begin{matrix} ClC_2H_4 \\ \diagdown \\ \quad S \\ \diagup \\ ClC_2H_4 \end{matrix}$$

The formula of the nitrogen mustards may be written:

$$\begin{matrix} ClC_2H_4 \\ \diagdown \\ \quad N\text{–}R \\ \diagup \\ ClC_2H_4 \end{matrix}$$

The nitrogen mustards have been given code numbers HN_1, HN_2, HN_3 *et cetera*. The preparation now mainly in use clinically, and the only one available commercially in Australia, is HN_3 methyl bis (β chloro ethyl) amine:

$$\begin{matrix} ClC_2H_4 \\ \diagdown \\ \quad N\text{–}CH_3 \\ \diagup \\ ClC_2H_4 \end{matrix}$$

Gilman, when investigating the pharmacological properties, reported the characteristic leucopenia and emphasized the susceptibility of lymphoid tissue to the cytotoxic action of these preparations. In association with Goodman and others (1946), he carried out therapeutic trials in humans. Mayo (1949) has reported the use of nitrogen mustard in this country.

It was first used at the Royal Prince Alfred Hospital, Sydney, in June, 1947, through the courtesy of Dr. C. P. Rhoads, Chairman of the Committee on Growth of the National Research Council (America).

It would appear to have its most striking effect in Hodgkin's disease, in which one has witnessed the rapid subsidence of fever, the dramatic relief of mediastinal obstructive symptoms and the disappearance of tumour masses. In one's personal experience the remissions produced have been short but satisfactory. The response to a second course has also been satisfactory. One patient, said to have been X-ray resistant, responded at least temporarily to this therapy. The response in the lymphoma groups (lymphoma, lymphoblastoma, reticulum cell sarcoma *et cetera*) is less predictable, but may be dramatic. Nitrogen mustard is used in the chronic leuchæmias, but Rhoads (1948) does not recommend it in chronic lymphatic leuchæmia because of the severe bone-marrow hypoplasia which may sometimes occur. In *polycythæmia vera* relief of symptoms and return of blood to normal has been observed in some cases, but it has been only of temporary duration. In lung carcinomata, particularly the anaplastic form, relief of symptoms and some regression of the lesion have been reported. Fortunately X-ray therapy and nitrogen mustard therapy can be used as adjuvants, and it would seem that this combined therapy may be more successful in controlling lung cancer.

It has been used in many diverse lesions. One of the first conditions treated at the Royal Prince Alfred Hospital was *mycosis fungoides*. The result was not encouraging, although satisfactory results have been reported elsewhere. Some favourable responses have been reported in Boeck's' sarcoid, in disseminated *lupus erythematosus*, in neuroblastoma and the like, but their exact significance remains uncertain.

Administration is not difficult. The dosage employed has been 0·1 milligramme per kilogram of body weight given on four successive days, or to seriously ill patients on alternate days. The drug in solution is introduced into the rubber tubing of a rapidly running intravenous saline infusion. In this way thrombophlebitis is avoided. The solution of the drug should be prepared immediately before use, as it rapidly deteriorates on standing, loses its efficiency, and may produce toxic effects. Nausea and vomiting occur in a large percentage of cases, but the use of barbiturates before or after administration sometimes prevents or diminishes this effect. In the peripheral blood lymphocytopenia may be found within twenty-four hours. The neutrophile cells decline progressively from fourteen to twenty-one days, and later still there may be a depression of the erythrocytes. It is rarely worrying. A degree of thrombocytopenia may occur during the third week. As a rule there is no hepatic or renal damage.

It is generally agreed that in most cases the response to, and the length of remission produced by, conventional radiotherapy techniques are superior to those obtained by nitrogen mustards. However, many other factors affect the choice of this therapeutic measure. In patients with severe obstructive phenomena a more rapid and less distressing response can be expected from nitrogen mustard. In widely disseminated disease it is obviously more effective. If the patient is resistant to radiotherapy it may be effective, but it is doubtful if it restores radiosensitivity.

Under conditions in Australia, where centres for radiotherapy are so limited and at such a distance, nitrogen mustard will permit the practitioner to bring some degree of relief to the patient without the hazard and discomfort of transportation, or will allow the alleviation of symptoms to a sufficient degree to permit removal to a metropolis for further treatment.

Endocrine Control.

The œstrogenic control of carcinoma of the prostate is now accepted as a routine therapeutic measure. It is a fascinating advance, for which Huggins (1941) deserves much credit. The biochemical diagnosis of metastasizing prostatic tumours by means of the acid phosphatase determination as described by the Gutmans (1938) is equally remarkable.

As a natural sequence androgens have been used in the treatment of breast carcinoma. Cutler and Schlemenson (1948) have reported this therapy, and conclude that there is no evidence that testosterone can cure advanced breast cancer, and that palliative results can be anticipated in only a relatively small number of cases.

In breast carcinoma occurring after the menopause, œstrogen therapy has been attempted, but the results are not favourable.

Radio-Active Substances.

It is doubtful if radio-active substances should be included in a discussion of the chemotherapy of malignant disease. Their use represents only another method of applying irradiation. Workers in this field hope that they may be able to obtain some chemical substance which is mainly distributed to, or localized in, the affected tissues. By the introduction of a radio-active element into this substance this activity may be localized to the diseased tissue, even if it is widely disseminated. Until now iodine with its high concentration within thyreoid tissue is the only substance answering this requirement. Phosphorus is perhaps found in somewhat greater concentration in bone and other hæmatopoietic tissues than elsewhere. Because of its comparatively long half-life and ready availability, P^{32} has been used in this country for the therapy of various blood dyscrasias, in particular *polycythæmia vera*. Experience with this product at the Royal Prince Alfred Hospital has been disappointing. The dose recommended is 4·0 millicuries. It would seem that such a dosage is too small to bring about an adequate response.

It appears that a greater field of usefulness for this substance will prove to be in the realms of investigation and diagnosis.

Conclusion.

At present the following conclusions may be accepted:

1. Nitrogen mustard therapy is warranted in disseminated lymphoma, either as the sole therapeutic measure or preferably as an adjunct to radiotherapy.

2. Urethane may be used in the treatment of chronic leuchæmia if radiotherapy is not available or for any reason is contraindicated.

3. Œstrogen therapy is the most efficient therapy in metastasizing prostatic malignant disease.

4. Stilbamidine is indicated in multiple myeloma in the presence of intractable pain.

5. In adequate dosage P^{32} should produce remissions in *polycythæmia vera*.

In our present state of knowledge it is doubtful whether (i) folic acid derivatives and antagonists are sufficiently free of dangerous complications to warrant their use in acute leuchæmia, or (ii) the use of androgen or œstrogen therapy is of any value in breast carcinoma.

Finally, as Gellhorn and Jones (1949) have stated, there is no objective indication that antireticular cytotoxic serum has had any effect in malignant disease, and therefore it should not be used. The products of microorganisms have potentialities as carcinolytic agents, but their value in human neoplastic disease has not been demonstrated.

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AN AUTOMATIC MACHINE FOR CONTROLLED RESPIRATION.

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THE increasing use in anæsthesia of relaxing agents such as "Tubarine" or "Flaxedil" in conjunction with controlled respiration for major surgery tends to focus attention on the possible elimination of manual control with all its disadvantages.

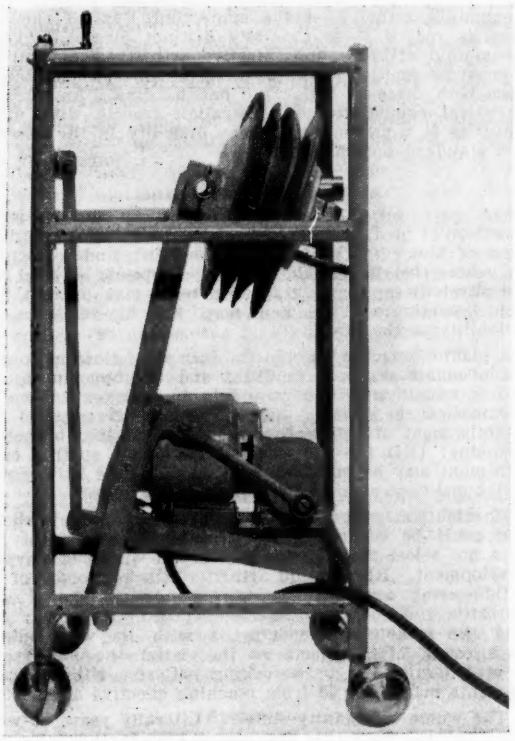

FIGURE I.

In Australia, physiologists for many years have used reliable automatic machines for breathing in curarized animals, and have in latter years often advised anæsthetists to adopt similar methods, but with little response.

In Sweden (Anderson, Crafoord and Frenckner, 1939) and in Denmark (Mørch, 1948), machines have been constructed and used successfully for many years, but have failed to interest anæsthetists in other countries, probably owing to their bulky and complicated design.

Following the simple principles practised in manually operated to-and-fro controlled breathing through a Water's canister, we have evolved a relatively simple and safe electro-mechanical system which can be used as a sound basis for further practical design and clinical investigation. The apparatus consists of a sparkless induction motor driving through suitable gearing a rubber bellows similar to the one used on the well known Coxeter-Mushin circle absorber. By means of a link motion controlled by a small, hand wheel the tidal volume can be altered to suit the patient's needs. The pressure in the circuit is controlled by a water manometer adjusted by a displacing plunger. This manometer also acts as a sensitive safety valve, and

FIGURE II.

will quickly detect such abuses as the surgeon's assistant using the patient's chest as an arm rest. The rate of breathing is kept constant at 20 per minute, and it has so far been found unnecessary to change this rate.

The machine is used in the following manner. Intubation is carried out with a cuffed tube, the patient being under "Pentothal" anæsthesia and a relaxing agent—for example, "Tubarine". The Water's canister is connected to the endotracheal tube, and the patient's breathing is maintained by means of the usual rubber reservoir bag, while the anæsthesia is in most cases maintained by cyclopropane and oxygen. The moment all the connexions are properly secured and gas-tight, the reservoir bag is removed and in its place is connected the breathing machine, the tidal volume being adjusted by means of the hand wheel to the requirements of the patient and altered, if necessary, at any time. The pressure in the circuit is adjusted by movement of the displacing plunger connected

to the water manometer, the usual reading being 100 to 130 millimetres of water.

Should the anæsthetist for any reason wish to change back to manual control, he simply disconnects the breathing machine and reconnects the manually operated rubber reservoir bag.

Extensive clinical experience with this automatic breathing machine has justified the claims made by Australian physiologists and Scandinavian anæsthetists concerning the superiority of automatic control over manual control. The only exception we have found is when a lung is being manœuvred during certain stages of an intrathoracic operation.

The use of this type of machine for artificial respiration combined with endotracheal suction in such emergencies as severe cases of barbiturate poisoning is obvious.

Figure III.

Acknowledgements.

I am indebted to Mr. R. H. M. Harrington, of the Pacific Electric Company, Proprietary, Limited, for designing and making the machine described and its experimental prototype. Thanks are due to Professor R. D. Wright for his many valuable suggestions and for his interest in this work, which was performed under his supervision. The work was done with the aid of a grant from the National Health and Medical Research Council.

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INCIDENCE OF RHEUMATISM: SOME ECONOMIC FACTORS.

By Paul White and L. J. A. Parr,
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"Rheumatic diseases do abound", wrote William Shakespeare. It would appear that this unhappy state of affairs still exists, and that it is the responsibility of the medical profession to bring the situation out of its present "Midsummer Night's Dream".

The purpose of this article is to give a short survey of the incidence and some general figures as to the probable cost of this group of diseases in other countries as well as in Australia, with a view to improving the lot of the local rheumatic sufferer.

Scope of Survey.

A clear picture is not easily drawn, since similar pathological conditions are variously termed by English and American authorities. For the purpose of this survey the broad boundaries of articular and non-articular rheumatism are used, while rheumatic fever and its cardiac and nervous sequelæ are not considered.

The need for a standard nomenclature of rheumatic diseases is urgent if there is to be any comparison of statistics on a world-wide basis. The situation as it now exists is somewhat disconcerting, as is indicated by the fact that the Americans regard ankylosing spondylitis as rheumatoid arthritis of the spine, but English rheumatologists regard it as a totally distinct disease. Again, rheumatoid arthritis and infective arthritis are regarded as separate entities in England, while American clinicians place both diseases under the one heading. An efficient statistical comparison of Australian results with other countries is a matter of extreme difficulty in the absence of a standard nomenclature.

A Planned Approach.

The haven of the chronic rheumatic is not so much a variety of medicines as a specialized clinic for the diagnosis of and research into his complaint, and a hospital bed where the rheumatologist, the orthopædic surgeon and the physiotherapist working as a team may prevent him from becoming a burden to himself and his relatives and a liability to the State.

A planned approach would embrace the following points: (i) adequate research facilities and the opportunity for both graduate and undergraduate to gain experience of rheumatism in courses and refresher courses; (ii) the establishment of rheumatology as a specialized branch of medicine; (iii) the education of the public so that early treatment may be instituted and unwarranted helplessness and hopelessness and their results be avoided.

Rheumatism takes its toll from groups which should and could be economically useful in the community; it does not select those at the end of the queue of physical development. Rheumatoid arthritis attacks women of the child-bearing age. Ankylosing spondylitis shares with fibrositis the role of aggressor against the young man and the athlete. Osteoarthritis with its wear-and-tear background often selects as its victim the middle-aged ex-athlete and the hard-working artisan. Still's disease prevents many a child from reaching effective adult life.

The whole community suffers. Literally years of working time are lost, this making serious inroads into production. Pensions loom as a burden to the non-rheumatic, but their slender support does little to comfort the arthritic. The rheumatic mother cannot produce or care for a large family, while with the increased life span noted in Australia the number of rheumatic sufferers in the population can but increase.

Only fully appreciated by the sufferer and his relations is the burden of misery of this group of diseases, the outlook punctuated by a stick and a crutch and ending in a wheel chair.

HOSPITALS AND CLINICS.

From the hospital angle, a central clinic where people are examined by appointment is the first essential unit. Thus women and workers in the early stages of rheumatic disorders may take the first step which leads to early diagnosis, and realize that treatment may be undertaken without interference with their home or occupation. Patients with advanced or fulminating disease should be referred to hospital beds allocated to clinic sufferers. These folk, when discharged from hospital may return to the clinic for physiotherapy and pathological checking, so that improvement may be maintained and the patient encouraged to undertake such work as comes within the ambit of his physical condition.

INCIDENCE AND COST.

Great Britain.

Rheumatism takes a tremendous toll in Great Britain. In 1944 Lord Horder made the following statement: "The number of adult sufferers from rheumatic diseases in England can be constructively estimated at a million with larger proportionate numbers in Scotland and Ireland."

One-sixth of the total absenteeism due to sickness is attributable to rheumatic disease.

In regard to cost, "Rheumatic diseases involve Great Britain in a yearly loss of £25,000,000. As a social and economic problem, rheumatism ranks third only to cancer and tuberculosis".

Scotland.

In 1937 in Scotland it was estimated that 45,300 fresh incapacities occurred from the rheumatic group of disorders during the year and that 3,000,000 working days were lost. No less than half of this time was lost by those whose incapacities lasted for the whole year. The situation is picturesquely and graphically put by a writer who states that "time lost by reason of chronic rheumatism is equal to having an army of 60,000 people off work all the year round".

United States of America.

The "Primer on Arthritis" states that rheumatism heads the list of specified chronic diseases in the United States of America. In 1935-1936, among 127,000,000 Americans it was estimated that 6,850,000 suffered from rheumatism and that some 147,000 persons were annually invalided. Time lost from work amounted to 97,200,000 days and the cost to the nation was $300,000,000 annually.

In prevalence rheumatic disorders rank first. They are second in producing disability and invalidity and fourteenth in the causation of death. (A figure quoted in *The Los Angeles Times* of January 25, 1949, indicates that there are 7,500,000 American sufferers.)

Sweden.

It is estimated that one twenty-fifth of the population of Sweden suffer from rheumatic diseases and that 100,000 are permanently incapacitated. Of total pensionable invalidity, 9% is due to rheumatism.

Switzerland.

In Switzerland the percentage incidence of rheumatism among other disorders is 16·2, while the cost in time lost is 240,000,000 Swiss francs (£14,000,000) and in expenditure on treatments 20,000,000 Swiss francs (£1,650,000).

Australia.

In Australia statistics relevant to the rheumatic problem are as rare as facilities available for its treatment.

In giving an analysis of causes of invalidity under *Invalid and Old Age Pensions Act*, J. H. L. Cumpston in 1916 listed as follows the main causes among 22,979 individuals: rheumatism 2714 (11·8%), phthisis 2532 (11·0%), diseases of the circulatory system 2280, hemiplegia 1555, accident 1481, defective vision 1403, senility 1367.

In 1928 D. J. Robertson analysed 42,136 claims for pensions granted during the years 1920-1926. His figures read as follows: diseases of the heart 5258 (12·5%), tuberculosis 4401 (10·4%), chronic rheumatism, osteoarthritis, gout 4359 (10·4%), bronchitis and asthma 1746 (4·1%), cancer 1590 (3·8%). Commenting on his figures regarding rheumatism, Cumpston made the following statement:

> The high figure under this heading is a surprising feature of this analysis, the fact that chronic inflammatory conditions of the joints play the largest part in the invalid pensions list must be accepted as indicating the undue predominance of such conditions. The fact that 28 per cent. of the total number of cases under this heading occurs under 50 years of age invites attention to the possibility of improving the position in this regard.

In an age group survey in 1916 Cumpston found the following distribution of rheumatic disorders: sixteen to twenty years, 1·5%; twenty to thirty years, 3·7%; thirty to forty years, 7·6%; forty to fifty years, 16·0%; fifty to sixty years, 46·2%; sixty to seventy years, 22·2%; seventy to eighty years, 2·8%.

Robertson in 1920 found that 29% of cases occurred in patients aged under forty years and 46% in those aged under fifty years.

Pensions.

A sharp upward trend is noted in the number of invalid pensions as seen in a survey from 1920 to 1940. In 1920 there were 35,231 invalid pensions, in 1930 63,304 and in 1938 88,812, the approximate cost then being £3,000,000. In 1940 there was a transfer of 32,351 invalid pensioners to the old age pension. There was, however, an actual increase of 2235 invalid pensions granted. In 1945 there were 63,000 invalid pensioners, the approximate cost being £4,000,000. While official figures are complicated and few in number, the above statement gives a signpost to the trend of the rheumatic disorders.

If we take the proportions of rheumatic disorders to other pensionable disabilities as found in the 1916 and 1928 surveys, the approximate numbers of sufferers drawing pensions and the cost in pensions will be as follows (Table I).

TABLE I.

Year.	Number of Pensioners.	Cost.
1938	8887	£30,000
1945	8000	£50,000

At an average wage of, say, £5 per week, the 1945 figure represents a loss in wages of £1,000,000 and a loss of over 1,000,000 working days.

In Industry.

A corner of the problem within Australian industrial life is seen in the case of the Sydney County Council (Electricity Undertaking), where there were 3639 employees in 1946. Of 5116 cases of sickness from all causes, 74 (1·3%) were due to articular rheumatism and 242 (4·7%) to non-articular rheumatism. Of 28,926, 1064 (3·3%) were due to articular rheumatism and 1836 (6·4%) to non-articular rheumatism. Thus 6% of all cases of sickness were produced by rheumatic disorders and 9·7% of the days lost were because of it.

Longevity.

There is a gradual shift in population from the younger to the older age group. This is a most important factor. In an age group survey Cumpston's incidence figures reduced to a percentage basis give the following indication: sixteen to twenty years, 1·5%; twenty to thirty years, 3·9%; thirty to forty years, 7·6%; forty to fifty years, 16·0%; fifty to sixty years, 46·2%; sixty to seventy years, 22·2%; seventy to eighty years, 2·8%.

Official figures show that the expectation of life has risen sharply in Australia (Table II).

The problem of rheumatism as an economic factor is therefore a growing one; with increase in the life span more victims are available for the juggernaut rheumatism with its emphasis on the later decades.

No figures or statistics of any type or from any source lighten the picture; rather from every angle the grimness of the outlook is underlined.

Thirty-three years ago Cumpston wrote as follows:

> The fact that chronic inflammatory conditions of the joints play the largest part in the invalid pensions list, must be accepted as indicating the undue predominance of such a condition. While the rheumatic group of disorders is not to be included in that class commonly referred to as preventable disorders, yet it is obvious that appropriate treatment applied at the time of the first appearance of symptoms, will in many cases entirely remove the trouble.

No organized, systematic, all-embracing plan has been formulated or put into operation in Australia to relieve the lot of rheumatic sufferers, who yearly become a larger pathetic band, a group playing no part in an expanding production. Not only do they themselves become casualties, but necessarily they immobilize manpower which is needed to care for them in their homes. From the pensions angle, these folk, whose extreme disability seldom is fatal, are a growing financial burden on the Commonwealth.

No planned, concerted effort is as yet evident in Australia to cope with this situation.

TABLE II.
Expectation of Life.

Year.	Male.	Female.
1890–1891 ..	47·2 years	50·8 years
1933–1934 ..	63·5 years	67·1 years

OVERSEAS ACTIVITY.

In England we find the Empire Rheumatism Council under the inspiring lead of Lord Horder planning a wide strategy aimed at reduction in the ravages of rheumatic disease.

In "A Plan for National Action", Lord Horder states that "considerations of humanity, of national safety, and of true economy, plead for some immediate effort to check rheumatic disease".

There is no field in which such effort can be more fruitful than in campaigns against the secular enemies of mankind's well-being—the agencies of preventible disease. War against rheumatism is one of the most urgent of these campaigns.

England has her specialized clinics and hospitals; Ellman reports that in England 30,000 beds are set aside for tuberculosis sufferers and 1000 for rheumatic patients, and that in a population of 45,000,000 where the degrees of invalidity from the two diseases are approximately equal.

Sweden, with a population of 6,500,000, is said to be in advance of every country from the rheumatological angle; some 3500 beds are allocated for research into and treatment of the disease. Teaching facilities are of a high order, and strong emphasis is laid in the community on early treatment. These factors produce results as seen in Kalmeter's figures. He estimates that if treatment is commenced within a year of the onset of symptoms, some 79% of patients experience considerable relief. In both Great Britain and America patients receiving adequate treatment, classified as "cured or relieved", amount to 75% to 95%.

The practical view taken by the Americans is shown by the fact that in New York City alone there are 25 special clinics for the sole purpose of treating rheumatism, while from coast to coast trained rheumatologists have hospital facilities for research, diagnosis and treatment. In the southern lobe of the continent an active Rheumatological Association exists in Mexico, Brazil and the Argentine.

Switzerland has formulated a model plan for health services for arthritis, which has in its ambit (*a*) preventive medicine, including surveys of housing and working conditions, and vocational and pre-vocational facilities, and (*b*) clinical diagnostic facilities, clinical treatment and physiotherapy.

A recent American scheme amplifies this, making provision for nursing care in the home, for specialized nursing homes, where patients may convalesce and have opportunities of rehabilitation and occupational therapy, and for the novel idea of a housekeeper service.

It would lift a huge burden of misery and economic loss if publicity were given to the figures of results of treatment. By backing these propaganda details with the tangible medical approach being adopted overseas, much can be done of a practical nature. Such action was foreshadowed by the Federal Council of the British Medical Association in Australia fifteen years ago (1934).

TABLE III.
Summary of Incidence, Cost and Facilities for Treatment of Rheumatism.

Country.	Invalidity. (Persons.)		Working Days Lost Annually.	Annual Cost.		Tuberculosis-Rheumatism Ratio.	Percentage Invalidism.	Treatment Facilities.
	Annual.	Total.		Medical Care.	Loss in Wages.			
England		1,000,000	21,000,000	£25,000,000	£40,000,000			1,000 beds set apart for rheumatic diseases. Specialized rheumatic clinics.
Scotland		43,300	3,000,000					
United States of America	147,000	6,850,000	97,200,000	$100,000,000	$200,000,000	1 : 10		Specialized clinics.
Sweden		260,000 100,000 of them permanently invalided.					9·0%	3,000 beds set apart.
Switzerland			16·4% of time lost in Swiss Railways.	20,000,000 Swiss francs (£1,160,000).	240,000,000 Swiss francs (£14,000,000).	1 : 36	16·2%	
Australia		Indefinite: refer only to invalid pensions.	Indefinite: approximately 1,000,000.			(From invalid pension figures) 1 : 1, therefore not a figure of actual morbidity.		

CONCLUSION.

The recent formation of an Australian Rheumatism Council is a heartening indication that the 1934 motion of the Federal Council—"that the Federal Council should consider the advisability of a full and comprehensive inquiry into rheumatism in Australia, similar to inquiries that have been conducted in other countries and also that the subject of rheumatoid arthritis should be fully discussed at the next Congress"—may yet come into effect. Lack of funds made it impracticable then. It would be a proof of constructive medical policy if such a step had government backing, especially in view of the quickening interest displayed in the rheumatic problem in medical circles.

A focused approach needs to be made to an Australian national medical problem of the first magnitude—a problem which has justly been termed "the greatest single enemy of social well-being and economic life".

REFERENCE.

"British Medical Association News. Meeting of the Federal Council" (1934), THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, page 366.

RECENT WORK ON THE SYMPHATHETIC TRANSMITTER AND ITS POSSIBLE RELATIONSHIP TO HUMAN HYPERTENSION.

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UNTIL recently it has been generally considered that the sympathetic transmitter was adrenaline. However, for many years, as will be indicated in the following brief historical survey, various workers have recognized that there were certain discrepancies between the action of injected adrenaline and of sympathetic stimulation, and that, on the other hand, there were resemblances between the effect of sympathetic stimulation of certain organs and of nor-adrenaline.

The chemical relationship between these two substances is shown in Figure I.

The only difference between them is the replacement of the methyl group of adrenaline by a hydrogen atom to form nor-adrenaline. The two compounds can be differentiated by their pharmacological actions, and also by certain colour reactions.

Each exists in a lævo and a dextro form, of which racemic mixtures may occur. The lævo isomers are the ones important biologically, and these are the forms about which most of the following discussion is centred.

Historical Survey.

As long ago as 1910, Barger and Dale pointed out the resemblances between the effects of sympathetic stimulation of certain organs and the action of various "sympathetico-mimetic" amines including nor-adrenaline.

In 1933, Cannon and Rosenblueth observed discrepancies between the action of injected adrenaline and the sympathetic hormone (referred to as "sympathin") produced by the stimulation of hepatic nerves. Thus, in the cat, after the administration of ergotoxine, stimulation of the hepatic nerves or of the lower abdominal sympathetic strands resulted in a rise in the arterial blood pressure, whereas injection of adrenaline produced a fall.

In 1934, Bacq suggested that the inhibitory effects produced by sympathetic stimulation were due to adrenaline, whereas the stimulatory effects might be produced by nor-adrenaline.

In 1942, Blashko presented chemical evidence for the formation of nor-adrenaline in the body, and stated that adrenaline was formed by N-methylation of nor-adrenaline.

In 1947, Bacq and Fischer, using the pharmacological test of the effect of the substance tested on the nictitating membrane and uterus of the non-pregnant cat, showed that extracts from the spleen of various animals contained nor-adrenaline, that extracts of splenic nerves and sympathetic chains contained a mixture of nor-adrenaline and adrenaline, whereas in extracts from human coronary arteries they could find adrenaline only. As a consequence, they regarded the sympathetic hormone as a mixture in varying proportions of nor-adrenaline and adrenaline, the former corresponding to "sympathin E" (excitatory) and the latter to "sympathin I" (inhibitory).

Recent work on nor-adrenaline has been along two main lines: the extraction of various tissues for nor-adrenaline, and the further elucidation of its pharmacological effects.

Extracts from splenic nerves were found by V. Euler (1948) to contain mainly nor-adrenaline. Bülbring and Burn (1949) have obtained from the suprarenal medulla following splanchnic stimulation either adrenaline only or mixtures in varying proportions of adrenaline and nor-adrenaline.

The difference in the pharmacological activity of adrenaline and nor-adrenaline has been investigated in the cat by Folkow, Frost and Uvnäs (1949). They found that adrenaline in small doses caused dilatation of muscle blood vessels (causing constriction only in large doses), whereas nor-adrenaline always caused constriction of these vessels; that adrenaline caused constriction of the skin blood vessels (the effect of nor-adrenaline on the skin blood vessels is not recorded); and that both adrenaline and nor-adrenaline caused constriction of the splanchnic vessels. In general, vasoconstriction caused by adrenaline is reversed to vasodilatation by dibenamine, whereas that due to nor-adrenaline is simply annulled.

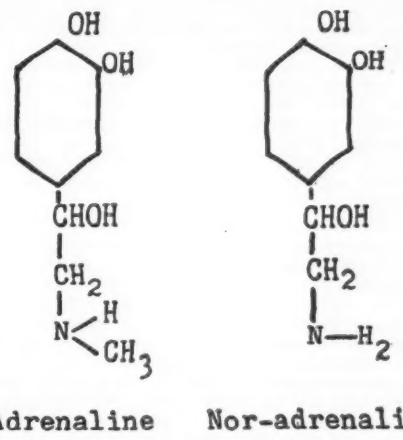

FIGURE I.

The present state of our knowledge of the sympathetic transmitter, as derived from the evidence of animal experiments, may be summarized as follows. There are two sympathetic ergones, adrenaline and nor-adrenaline. Of these, adrenaline has been found to have excitatory effects in some tissues (causing constriction of skin and splanchnic vessels) and inhibitory effects in others (causing dilatation of muscle vessels), whereas nor-adrenaline has been found to have excitatory effects only, causing constriction of all vessels on which its action has been tested.

Estimations of the ergone present in various sympathetic nerves have shown it to be mainly nor-adrenaline, whereas that found in the suprarenal gland as a result of sympathetic stimulation is either adrenaline or a mixture in varying proportions of adrenaline and nor-adrenaline.

It would appear therefore that the excitatory effects of stimulation of a sympathetic nerve are due to nor-adrenaline (and not to adrenaline as previously believed), but that sympathetic stimulation of the suprarenal medulla causes liberation of adrenaline, producing excitatory effects on certain tissues and inhibitory effects on others.

The reported finding of adrenaline only in extracts from human coronary arteries suggests the possibility that some sympathetic nerves such as those to tissues such as heart and skeletal muscle in which adrenaline causes vasodilatation may act by the liberation of adrenaline.

Other workers (Bülbring and Burn, 1935; Folkow and Uvnäs, 1948; Folkow, Frost, Haeger and Unväs, 1948) claim to have shown that sympathetic vasodilatation both of skeletal muscle vessels and of coronary vessels in the dog and cat is due to acetylcholine. Still other workers (v. Euler and Åström) claim to have obtained evidence for the liberation of histamine from the splenic nerves of cattle after stimulation, and argue that certain autonomic nerves contain histaminergic fibres. The question of sympathetic vasodilatation needs further investigation.

Investigations of the Effects of Nor-Adrenaline in the Human.

Goldenberg and his fellow workers (Goldenberg, Rene, Baldwin, Greene and Roh, 1948) have compared the effects in the human of infusions of adrenaline and of nor-adrenaline. They found, using nor-adrenaline: (i) that the cardiac output determined by using the technique of cardiac catherization was unchanged or moderately decreased (whereas it was much increased with adrenaline); (ii) that the systolic arterial blood pressure was raised in all cases and the diastolic in most cases, with a rise in the mean systemic arterial pressure (whereas with adrenaline there was a rise in the systolic arterial pressure, no significant change in the diastolic pressure, and slight if any change in the mean pressure); (iii) that the pulse rate was decreased (whereas it was increased with adrenaline); (iv) that the pulmonary arterial pressure was raised (a similar effect occurring with adrenaline); (v) that the total peripheral resistance was increased (whereas it was decreased with adrenaline).

Investigations have also been in progress at Saint Mary's Hospital, London, on the effects in the human of continuous intravenous infusions of adrenaline and of nor-adrenaline. The effects on the pulse rate and blood pressure were similar to those reported by Goldenberg and his co-workers, infusion of nor-adrenaline producing a rise in both the systolic and diastolic arterial blood pressures (whereas adrenaline produced a rise in the systolic pressure but no change or a fall in the diastolic pressure), and a slowing of the pulse rate (whereas adrenaline produced an increased rate). The slowing of the pulse rate due to nor-adrenaline was abolished by atropine.

Forearm blood flows, which are a measure of the muscle blood flow, have been measured by the technique of venous occlusion plethysmography, and in the case of nor-adrenaline infusions have shown no significant change or a decrease (contrasted with an increase with an equivalent dosage of adrenaline).

Possible Importance of Nor-Adrenaline in Human Hypertension.

A phæochromocytoma of the adrenal is a rare cause of human hypertension. In addition to producing paroxysmal arterial hypertension, this condition may cause a sustained systolic and diastolic arterial hypertension. The diastolic hypertension would be difficult to explain under the old belief that suprarenal medullary tissue secreted only adrenaline. As was previously mentioned, it has now been shown that the suprarenal medulla may contain a varying proportion of nor-adrenaline. In each of three phæochromocytomata recently removed at Saint Mary's Hospital the ergone predominantly present was nor-adrenaline.

The mechanism of production of essential hypertension is still undecided. There is no change in the cardiac output and it has therefore been presumed that the cause is in increased peripheral resistance. The calibre of the peripheral vessels may be altered by two main mechanisms: nervous and humoral. In spite of the increased pressure the blood flow through muscle and skin is unaltered (Pickering, 1936), suggested that the vasoconstrictor agent acts universally. This has been held to be more in favour of a humoral agent.

The humoral agent that has gained most prominence as a possible cause of essential hypertension is renin, but the renin hypothesis has certain disadvantages, particularly in that renin has not been demonstrated in increased amount in cases of human essential hypertension, and that it has not been possible to produce hypertension lasting longer than a few weeks by continuous infusion of renin in animals.

Adrenaline cannot be the agent concerned in the production of human essential hypertension, as it causes a decrease in the skin blood flow, an increase in the muscle blood flow and no diastolic hypertension. With the demonstration of the physiological importance of nor-adrenaline, we have another pressor substance for consideration in relation to the causation of essential hypertension. As has been pointed out, nor-adrenaline appears to be a universal vasoconstrictor, and produces a rise in the systolic and diastolic arterial blood pressures with no change in the cardiac output. Thus it may possibly be the agent concerned in human essential hypertension; but to determine whether such is indeed the case will require much more investigation.

Acknowledgements.

The writer became interested in this subject when holding a travelling scholarship in medicine donated by the Returned Sailors and Soldiers Children's Scholarship Fund, and grateful acknowledgement is made to the trustees of this fund. His sincere thanks are due to Professor G. W. Pickering, of Saint Mary's Hospital, London, for permission to work in his unit and for suggesting joining in the work on nor-adrenaline. The work referred to concerning the actions of adrenaline and nor-adrenaline at Saint Mary's Hospital was done in association with Dr. R. B. Blacket and Dr. G. M. Wilson, and will be reported in detail elsewhere.

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CHONDROMALACIA PATELLÆ.[1]

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THE condition of chondromalacia of the patella was first brought to my notice in April, 1945, when I operated upon a woman, aged forty-eight years, for an intermittent swelling and pain in the left knee, which I thought at the time was probably due to a loose body in the outer suprapatellar pouch. However, at operation the condition was found to be a localized thickening of the synovial tissues at the side of the patella, and inspection of the joint revealed an area of what we now know to be the changes of chondromalacia on the undersurface of its outer facet. The patella was removed and a good functional result was obtained.

The condition was again brought to my notice by another army surgeon who had seen several patients demonstrated when he attended a meeting at which this subject was discussed by two American surgeons, and I have since found what I think to be their report on chondromalacia of the patella in the October, 1945, number of *Surgery, Gynecology and Obstetrics.*

Since that time I have seen a number of these patients, and have had a series of 25 patients who have been operated on, from which I had hoped to give this paper.

However, in October, 1947, Jacob Bronitsky published an excellent article on this subject, and then in March, 1948, Charles Gray of England also published a splendid paper on the same subject. In these papers they have given such a good description of the condition that there is very little left which one can add.

From these cases that have come under my observation, a summary of which I will give later, there are certain points which might be brought forward for discussion.

Ætiology: Can Degeneration of the Cartilage of the Patella Occur without Trauma, Giving Rise to Changes of Chondromalacia?

In a number of cases on record, and in several of my cases, a history of trauma is given, such as falling on the knee, or some heavy object hitting the patella when the knee was in the partially flexed position. With a history of such direct force, one could visualize some injury to the cartilage, or even to the subjacent bone, which might affect the overlying cartilage with resulting destruction.

The following are three examples of a different type of lesion which seem to give the same pathological result.

A young soldier, aged twenty-three years, was doing full knee-bending exercises at physical training when he suddenly heard a crack in the affected knee, and from then he had intermittent symptoms, diagnosed as due to internal derangement of the knee joint. In August, 1944, an operation was performed for the removal of the medial meniscus, which was found to be normal. In April, 1948, as all symptoms and signs strongly suggested chondromalacia, the patella was removed, and at operation I found a cauliflower-like growth on the medial facet with normal cartilage elsewhere. This young man has now been discharged back to his work as a plumber, with a full range of painless movement.

The second case is that of a man, aged twenty-eight years, a sheet-metal worker, whose symptoms first occurred on April 15, 1947. He reported to the clinic because his knee had been swollen for three and a half weeks, occasional pain in the knee having occurred for four weeks before this. He gave practically all the symptoms suggestive of chondromalacia of the patella, except that there was no tendency of the knee to buckle or any momentary locking. He had been resting the knee and he was treated by quadriceps exercises and continuance of rest. However, he obtained no relief from the symptoms, and although the condition was of short duration, he was admitted to hospital for exploration of the patella. Operation revealed pronounced softening of the cartilage passing transversely across the patella, with a split three-eighths of an inch long in the centre. A more detailed description of these findings will be given under the discussion on pathological changes. It was three and a half months before the patient returned to work. When he was examined again twelve months after the operation, he had excellent function, was doing full work, could kneel on the knee and could run well, although sometimes running was not an easy, free motion.

The third case is that of a girl, aged twenty-three years, with a five-year history of discomfort in the right knee. Prior to October, 1943, she had suffered from acute tonsillitis practically every year for the preceding few years, with recurrent sore throats in the interval. In June, 1943, she had an attack of acute tonsillitis, which was followed by acute swelling of the right knee. She was treated from October, 1943, for pain in the right knee and limitation of movement, returning to duty in February, 1944. Tonsillectomy was performed in 1945. From 1944 to 1946 she had only two or three slight swellings in the knee, but she had no pain except after much walking or heavy work, and especially at night.

The patient then commenced work as a nurse in a hospital where there was a considerable amount of walking up and down stairs, and actually she had to sleep on the third floor, which meant walking up three flights of stairs whenever she went to her room. From January, 1947, the pain was more severe, and was accompanied by pronounced crunching and crepitus and inability to walk upstairs normally. When she was examined in May, 1947, she had all the signs and symptoms of chondromalacia of the patella. At operation in June, 1947, the patella was removed; the typical changes were present in the cartilage, and the synovial membrane was thickened, velvety and injected. When the patient was last examined, twelve months after the operation, she had very little discomfort, except on changes of weather, and she is doing full duties in the same hospital.

The first case shows that an injury can be caused to the cartilage of the patella by normal actions during exercises. It is interesting to note that in this patella the remaining cartilage looked healthy and of normal white colour, with no softening over the surface of the patella.

The second case shows the changes following intermittent pressure of the patella against the condyle in the flexed position; and the changes seen have been described above.

The third case possibly shows that after an infection of the joint, the physiology of the synovial fluid is changed; this may have caused the destructive changes which seem to have progressed since then to the condition as seen at operation.

The Incidence of Chondromalacia.

It is well known that chondromalacia has been noted, with a definite focus of softening and fissuring, in the absence of complaint by the patient of any abnormality in the knee joint.

I have operated on three such patients with a lesion of the meniscus, and I have examined the patella and noted the change in the patellar surface; and yet no complaint had been made except that of intermittent locking of the meniscus. It is difficult to understand why such patients should not have symptoms sufficient to warrant treatment of this condition. Moreover, two or three patients, who had been tried with conservative treatment, stated that the symptoms appeared to be relieved and that the knee had returned to normal, only to have the symptoms recur for no known reason.

I am attempting to follow up these patients to see if any symptoms of chondromalacia of the patella will occur.

Pathology.

The pathology of *chondromalacia patellæ* has been well discussed. When I operated at our clinic on one patient with a very short history (this is the patient mentioned previously under "Ætiology"), the changes seen in the patella appeared to me to be those which would take place in all early cases. When the joint was opened from the outer side for inspection of the undersurface of the patella, none of the usual fibrillation of the cartilage as seen in later cases was present; by the aid of a good light, a central area of discoloration was found, about half an inch wide, yellowish in colour, opaque, and slightly roughened and raised, running across from the external side towards

[1] Read at the annual meeting of the Australian Orthopædic Association, Perth, August, 1948.

the mid-line, while the cartilage above and below this area was white and of normal appearance. By palpation of this area with the blunt end of Spencer Wells forceps, it could be made to sink in easily to this central portion for just over one-eighth of an inch, but as pressure was applied further towards the more normal-looking cartilage it did not dent in as much as in the central part. The same pressure applied over the apparently normal cartilage hardly made any impression on its surface. The patella was then further mobilized, and in the centre a small split was seen about three-eighths of an inch in length, running transversely across the patella, practically at the junction of the two facets. With a small probe passed in the depth of this fissure the bone could be felt, and the probe entered for a distance of nearly a quarter of an inch.

Although this was a very early case, the decision was made then to remove the patella. On further inspection of the patella, it showed all the signs enumerated above, and the central portion was soft to the pressure applied by the thumb over this same area, its colour being easily noted in a good light.

From these changes, it could easily be seen how the progress of the destruction of the cartilage would take place—the softening and swelling affecting the cells of the cartilage layer, with an increase of the fissures and undermining (which are often seen in the more advanced cases) and gradual fibrillation around the edges of the fissures and clefts, until the more typical appearances developed which are most often seen in patients treated surgically.

Clinical Symptomatology.

The symptoms have been well reported in the two papers already mentioned. I shall give only a summary of the symptoms in relation to their proportionate occurrence in the 25 cases on which I have been able to report. The symptoms are as follows: tenderness below the patella, 22 cases; swelling, 21; inability to climb stairs, 21; pain on movement, 21; pain on moving with pressure on the patella, 21; grating or crepitus on movement, 20; tenderness on either medial or lateral undersurface of the patella, 19; aching, 18; wasting of quadriceps, 18; aching at night, 18; tendency of knee to buckle on walking, 16; momentary locking, 14.

It will be noted from the above statement that the proportionate relationship in these signs and symptoms is very close, so that we have here a fairly typical syndrome to be kept in mind when a knee joint is being examined.

Treatment.

Several of these patients had conservative treatment for a considerable time, and others were given conservative treatment over several months before operation was performed. Of the types of operation performed, I considered there were only two of any value, and these were complete excision of the patella and chondrectomy.

All these patients were treated by total excision, because, from a study of the condition at the time of operation, any type of chondrectomy, in my opinion, would not have relieved the condition, except in one case. In that case I thought chondrectomy might have been satisfactory, but I decided not to perform this type of operation. On study of this specimen now, it is obvious that chondrectomy would have been satisfactory.

At operation, the patella was always inspected through a short lateral parapatellar incision, and removed if the expected lesion was found. I am not in favour of a long parapatellar incision in which the whole surface of the patella can be easily inspected.

Results.

In considering the results in these cases, I have divided them into three main groups. The first comprises those in which the joint changes were mainly associated with the patella, with only some minor destructive changes on the condyles of the femur. The second group are those cases in which the symptoms were mainly similar to those of chondromalacia of the patella, but in which at operation further osteoarthritic changes were found on the condyles of the femur, or on the tibia, or in both places, without many X-ray changes. The third and smallest group were those cases in which fairly advanced osteoarthritic changes were revealed by X rays. Two of these patients had been treated with lactic acid without benefit, and were in the later age group.

In the first group, comprising roughly two-thirds of these 25 cases, the results were uniformly good, all patients having a normal range of movement and being well pleased at having had the patella removed. Some patients were relieved of all symptoms and signs; but the greater number stated that they still had some discomfort in the knee, following a very heavy day, or on changes of weather, or after sitting for a long time, especially in a cinema.

One common post-operative symptom which caused discomfort was tenderness over the outer condylar edge of the femur. Patients often pointed to this position as a point of tenderness, causing the greatest discomfort of any of the post-operative symptoms. The reason for this, I think, is that the outer edge of the condyle is higher than the inner edge, and presents a more prominent ridge than the inner condyle, and as the knee flexes, the capsule and its subjacent synovial lining are stretched over the condylar ridge with each movement of the knee joint; this stretching sets up local irritation resulting in the discomfort of which the patients complain. This stretching can be demonstrated at operation after the suturing of the tendon.

When the patella is present, the capsule is inserted on the outer edge of the patella and is thus kept off this ridge as the patella moves over the condylar surface.

The second group comprises four patients with symptoms of *chondromalacia patellæ*, with slight arthritic changes seen by X rays, and showing at operation pronounced evidence of arthritic changes on the condyles of the femur and on the tibia. These patients presented mainly symptoms and signs related to chondromalacia of the patella, and reacted on removal of the patella in the same way as the patients who did not show much arthritic change on the other joint surfaces. In fact, one patient recovered as quickly as some of the patients who had only changes under the patella. In this case, I smoothed off with a chisel a few of the osteophytic outgrowths from the edge of the condyle.

In the third group, in which there were three patients, as two of these had had lactic acid treatment without any benefit and were still suffering from considerable discomfort in the knee joint, I decided to try the removal of the patella to see if they would be relieved of most of their symptoms. The first patient was aged forty-nine years, the second sixty-one years, and the third sixty-nine years. The first two have pleasing results with full range of movement, and have symptoms of discomfort only when sitting for a long period or of aching at night after a very heavy day. The third patient, a very active man, aged sixty-nine years, was operated upon nearly three months ago; he informed me last week that his condition was improved, and that he had nearly a normal range of knee movement.

One case must be regarded as a complete failure. The patient, a young man, aged twenty-three years, was operated upon in March, 1946, for removal of a loose body of *osteochondritis dissecans*, and at the time of operation, it was reported that signs of chondromalacia of the patella were present. An osteochondritic cavity was found on the external side of the medial femoral condyle, and two small loose fragments of cartilage were removed from its edges. The loose body seen in the X-ray film was removed from the back of the joint. On the medial edge of the patella gross fragmentation of the articular surface was present over a circumscribed area. This ragged cartilage was excised with a knife and the joint was closed. In October, 1946, the patient was given considerable physiotherapy without result.

In February, 1947, the patella was excised, and changes of chondromalacia were found in it. The remainder of the joint appeared fairly normal, except for redundancy of the synovial membrane, which was a reddish-brown in colour.

Although this man soon had a full range of painless movement when examined, he stated that he had constant pain in the knee, especially over the outer edge of the external condyle. Considerable conservative treatment was

tried, without success, and as he still complained mainly of this pain, the external condyle was lowered by a wedge resection. However, the symptoms were not relieved, and after a further period of conservative treatment by the application of a caliper, it was decided after consultation that the only alternative seemed to be fusion of the knee joint. This operation was performed in August, 1948. I feel sure that the mental attitude of this patient to the pain in his knee had some psychological exaggeration. At operation, as was expected, no pronounced osteoarthritic changes were found in the joint.

Is There a Definite Relationship between Chondromalacia Patellæ and Osteoarthritis of the Knee Joint?

I consider, from my observations on these cases at operation, that there is an increase in the destructive changes on the other parts of the joint, the more advanced changes being shown in the patella. As we know that in all severely osteoarthritic knee-joints considerable osteoarthritic changes are found in the patella, it seems probable that *chondromalacia patellæ* is one of the main causes of the advanced arthritic changes we see in later life.

As these five patients with advanced osteoarthritic changes have shown so much improvement following removal of the patella, I suggest that it would be worthwhile considering patellectomy in certain cases of painful osteoarthritis, if careful judgement was given to the case under consideration, and especially to the psychological condition of the patient.

Young and Ryan report 14 cases of osteoarthritis with excellent results in seven following patellectomy, good results in four and poor results in three.

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SURGICAL TREATMENT OF COARCTATION OF THE AORTA.

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COARCTATION of the aorta is a condition of localized narrowing of the aorta. It varies in degree from a minimal constriction to complete occlusion of the lumen. It is usually situated adjacent to the attachment of the *ligamentum arteriosum* to the aorta. It may, however, be at a considerable distance from this, even so far as the abdominal aorta.

PATHOLOGY.

There are two types of coarctation—the infantile type and the adult type.

The infantile type is characterized by the presence of a relatively long coarctation extending from the subclavian artery down to a point just proximal to the entrance of the patent *ductus arteriosus*.

The adult type is characterized by the presence of a narrow, ring-like constriction of the aorta, which is usually just at or proximal to the site of attachment of the *ligamentum arteriosum*, but which may be even proximal to the subclavian artery or as far distal as the abdominal aorta.

These two types are distinct anatomically and also clinically. The infantile type is usually associated with neonatal death, whereas the adult type is usually associated with survival.

Taussig believes that coarctation is produced as a developmental anomaly *in utero*. In the infantile type there is very little interference with or obstruction to the fœtal blood flow. The blood reaches the distal part of the aorta from the pulmonary artery by way of the *ductus arteriosus*, which is distal to the coarctation. As there is little or no obstruction, there is no stimulus to the formation of anastomotic vessels. When the child is born, and the ductus closes, the absence of compensatory anastomotic vessels causes the death of the child. Taussig believes that in the adult type there is obstruction to the flow *in utero*, with resultant development of anastomotic vessels, so that at birth with closure of the *ductus arteriosus* an adequate anastomotic circulation has already developed and so the child survives.

ÆTIOLOGY.

Coarctation ocurs most frequently in males—according to Lewis eight times more frequently than in females.

When the condition occurs in females, it is frequently associated with ovarian deficiency. These facts have led Taussig to suggest that possibly an actual or relative preponderance of male hormones in these patients is an ætiological factor in coarctation of the aorta.

The usually stated skodaic theory that coarctation is due to continuance into the aorta of the normal obliterative process of the *ductus arteriosus* is probably not correct. This is suggested by the occurrence of coarctation at a distance from the *ligamentum arteriosum*.

RESULTS OF COARCTATION.

Constriction of the aorta results in an inadequate flow of blood caudal to the constriction. This is compensated for by the enormous development of anastomotic vessels.

There is usually, although not invariably, an acutai increase of blood pressure proximal to the constriction (recordable in the arms). Usually blood pressure is greatly reduced distal to the constriction (recordable in the legs).

As a consequence of the diminished and slowed flow distal to the constriction, a mild degree of ischæmia is produced in the kidneys. This is compensated for in early life, but at the beginning of the third decade, when vascular degeneration commences, this compensation is lost.

The ischæmia now produces hypertensive substances, which tend to cause an elevation of blood pressure over the whole body (Case II).

Degenerative changes occur early in the aortic arch, frequently resulting in aneurysmal dilatation of the ascending aorta. It is not uncommon for bacterial arteritis due to *Streptococcus viridans* to develop at the constricted site.

Degenerative changes occur early in the myocardium, so that cardiac failure is a frequent mode of death.

As a result of the hypertension in the cranial vessels, cerebro-vascular accidents are common and fatal.

CLINICAL FEATURES.

Symptoms.

The most common symptoms are headache and dyspnœa. Disturbances of vision, epistaxis, thoracic pain and palpitation are frequently observed. Weakness of the legs or even intermittent claudication may be observed. It is important to remember the occurrence of the abdominal type of coarctation when one is dealing with an unusual case of intermittent claudication.

Signs.

Usually the patient is a well-developed, somewhat plethoric male. Enlarged anastomotic vessels may be observed in the cervical, thoracic and scapular regions. Absence of the abdominal aortic pulsation will be apparent, as also will be the absence or diminution of the femoral, popliteal and *dorsalis pedis* pulses. Wounds on the distal extremities may be observed to heal less readily than wounds on the upper extremities. Obviously these signs must be correlated with the degree of coarctation and with

the development of collateral vessels. Retinoscopy will usually reveal engorgement and evidence of early arteriosclerotic changes. The blood pressure findings are variable. It is usual to find a considerable degree of hypertension in the arms and a low blood pressure in the legs. It is not uncommon, however, for there to be very little elevation of blood pressure in the arms. Conversely, in the later stages, it is not uncommon to find some hypertension in the legs (Case II). It is important to realize that the degree of hypertension is not an absolute index of the degree of coarctation.

Electrocardiography is of no great value in making a diagnosis. Auscultation may reveal a continuous systolic bruit, heard well posteriorly. Soft bruits may be heard at unusual sites over large aggregations of anastomotic vessels. The characteristic machinery bruit of a patent *ductus arteriosus* may be heard if this is present, but its absence does not exclude the possibility of a patent ductus (Case I).

Radiological Findings.

Frequently the condition is diagnosed after some routine radiological examination of the chest. Some enlargement of the cardiac shadow is frequently observed, particularly projection of the right margin of the heart beyond the sternum consequent upon dilatation of the ascending aorta. Diminution or absence of the aortic knuckle is common.

If the patient has survived for a sufficient number of years (approximately eight), usually some notching of the lower portions of the ribs will be apparent. It should be noted that it is not the lower borders of the ribs that are first notched, but the upper margins of the sub-costal grooves.

Angiography after the injection of radio-opaque substances may be helpful in making the diagnosis and indicating the exact site of the coarctation. Too great reliance should not be put upon the angiographic evidence of an infantile type, as the jet of opaque medium often gives the appearance of an elongated coarctation, when in actual fact a ring-like constriction is present.

Treatment.

The possible methods of treatment now available are medical and surgical.

It is important to remember that many subjects with coarctation live to a considerable age (ninety-two years in one instance) or, on the other hand, the presence of a condition of coarctation sufficient to produce symptoms is usually associated with a greatly diminished life expectancy.

At the present time, it is thought advisable to advise surgical treatment in one case in four. The very real hazards of the operation must be carefully correlated with the natural hazards of the condition.

The Surgical Procedures Available.

Three surgical procedures may be employed.

1. Resection and end-to-end anastomosis of the aortic ends will be the method of choice in operation on the young patient with the ring-like adult type of coarctation. In these cases there is no great separation of the two portions of the aorta after resection, and there is usually no great disparity in size.

2. Resection with division of the carotid or subclavian artery and its anastomosis to the distal portion of the aorta will be used when there is a considerable distance to be bridged after resection, and/or if the proximal portion of the aorta is relatively narrow. This latter condition is usually accompanied by a large subclavian artery, which, when turned down, is suitable for anastomosis.

3. End-to-side anastomosis of the divided subclavian artery to the distal portion of the aorta may be used for the "borderline" patient, entering the third decade, who otherwise presents a classical picture of coarctation and in whom there is no evidence of secondary elevation of the blood pressure in the distal part of the body (Case II).

Selection of Patients for Operation.

At the present time, opinion about the desirability of surgical treatment is somewhat conservative. As experience is gained, no doubt there will be a general broadening of opinion.

1. It is agreed that patients aged under twenty years with very high blood pressure in the upper extremities should be subjected to operation.

2. Patients aged over thirty years should not be subjected to operation. It is probable that the employment of the less radical operation of subclavian-aortic anastomosis will, in the future, make the strict observation of this rule less necessary.

3. Patients aged between twenty and thirty years with high blood pressure in the arms and low blood pressure in the legs should be carefully assessed. If there is no sign of renal deficiency, then operation should be advised. Minor cerebral episodes indicate that the necessity for operation is urgent, and that the hazards of the operation should be faced.

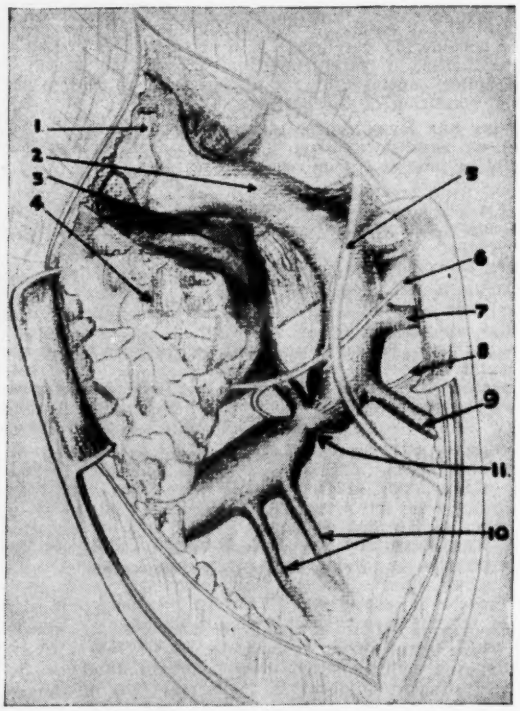

FIGURE I.

Exposure of aortic arch, showing position of coarctation and *ductus arteriosus*: 1, left ventricle; 2, aorta; 3, left bronchus; 4, lung; 5, left superior intercostal vein; 6, vagus; 7, left subclavian artery; 8, recurrent nerve; 9, third left intercostal artery; 10, fourth and fifth left intercostal arteries; 11, coarctation and *ductus arteriosus*.

4. Patients who have an elevation above normal of the blood pressure in the legs should not be subjected to operation. There are two reasons for this: (i) the anastomosis must be very considerable to allow this to occur; (ii) its existence indicates usually some degree of renal damage which is progressive and, like the hyperpiesis, is irreversible.

5. Patients who have normal blood pressure in the arms, but an absence of abdominal, femoral, popliteal and *dorsalis pedis* pulses, should be observed. Some will develop renal ischæmia and present generalized hypertension associated with coarctation. This should be circumvented by operation if possible.

Method of Operation.

Anæsthesia.

In this country, probably the best anæsthetic agent is cyclopropane, complemented with curare.

Blood Replacement.

It is essential to have a very large amount of blood available (at least ten pints). It is of interest to note that in a simple thoracotomy, there is a loss of approximately 500 millilitres of blood, so the blood loss during an operation for coarctation should be anticipated to be considerably more. The amount of blood to be given is estimated at the time of operation by the surgeon and anæsthetist, who are in a position to observe the amount of blood lost and

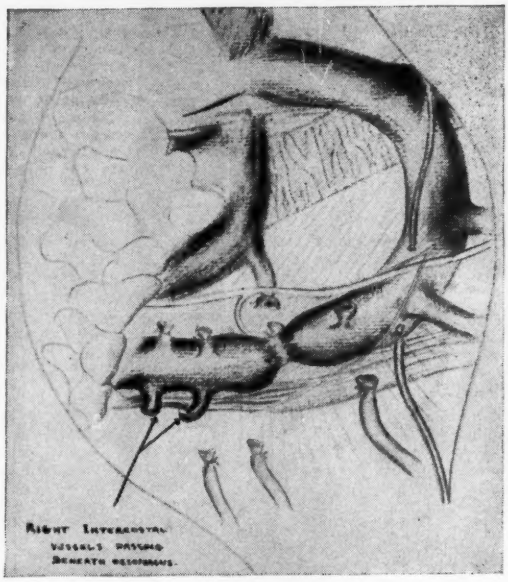

FIGURE II.

Exposure of right intercostal vessels by rotation of aorta following division of left intercostals.

the other recordable signs. The post-operative administration of blood is best controlled by hæmoglobin, plasma-protein and hæmatocrit estimations.

Incision and Technique.

The adequacy of exposure obtained by the usual postero-lateral incision more than compensates for the increased vascularity encountered in this region. Extreme caution must be exercised and great care with hæmostasis observed, small sections of the incision being made and dealt with as they are made.

The incision should extend from the level of the second thoracic spine, parallel to the vertebral border of the scapula and curving below the angle of the scapula to reach the fourth costal cartilage. The muscles are divided in the line of this incision. The scapula can then be retracted, so that the whole of the fourth rib is exposed. This is then carefully resected subperiosteally, great care being taken not to damage the adjacent intercostal vessels. It is advisable to resect small sections of the third and fifth ribs at their angles. Adequate exposure by spreading of the ribs must be obtained, before the operation is proceeded with.

The site of the coarctation is usually apparent, but it must be remembered that the outer appearance of the aorta is no reliable guide to the degree of constriction. Some of the most extreme coarctations have been present when there was only a slight indentation of the outer surface of the aorta.

With the lung adequately retracted, the parietal pleura over the aortic arch is divided in a line parallel to the left subclavian artery, extending above the arch for one and a half inches and down behind the root of the lung for two inches (Figure I.) The flaps of parietal pleura should be reflected and the vagus and recurrent laryngeal nerves carefully isolated.

The arch of the aorta is then mobilized by blunt dissection. Extreme caution must be exercised in carefully isolating and dividing the enormously dilated intercostal arteries at a short distance from the wall of the aorta (Figure II). This is necessary, as their point of origin from the aorta may be very brittle. The third right intercostal artery is an extremely difficult one with which to deal. This artery is difficult to observe before the aorta is mobilized, but it is the very act of mobilizing the aorta that causes the vessel to be torn. It bleeds profusely from both ends, the distal end retracting in a disconcerting manner behind the œsophagus. Hæmorrhage from this vessel may be diastrous if great caution is not exercised and liberal quantities of blood for rapid infusion are not available.

Division of the *ligamentum arteriosum* or patent *ductus arteriosus* will aid mobilization of the aorta considerably, so that it can be held forward by tapes.

The thoracic duct should be isolated to avoid injury. Should it be divided, it is imperative that both ends should be ligated.

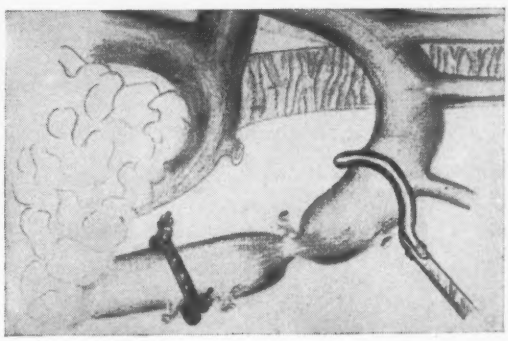

FIGURE III.

Position of clamps prior to excision of coarctation.

When the aortic arch and about two inches of the descending aorta have been mobilized, compression clamps are applied above and below the area of coarctation (Figure III). These are applied so that after resection there is a frill of about a quarter of an inch. This frill has a great tendency to retract, so due allowance must be made for this. By forward rotation of the clamps, the posterior walls may be approximated by a continuous everting suture (Figure IV). Gross recommends "Deknatel", "00000". There is no great disadvantage in using a stouter thread, which is much more easily handled. As the anterior wall is approached, the clamps are rotated backwards, and the suturing is continued.

The actual anastomosis is not difficult. The edges should be everted as in Figure V. When the anastomosis has been made, the blood should be allowed to flow through the aorta very slowly. This is to allow compensation for the greatly increased outlet that is now available, and for the diminished return of blood to the heart which occurs with too sudden release of the clamps.

The distal clamp is slowly released first, and then over a period of ten minutes the proximal clamp is slowly opened.

Further precautions to aid the return of blood to the heart are to put the patient in a slight Trendelenburg position and to infuse 200 millilitres of blood rapidly.

The parietal pleura is closed over the aorta with interrupted thread sutures. The chest wall is closed in layers.

It is probably wise in most instances to leave a tube in the chest, which is connected to a water-seal bottle. This drains off any fluid accumulation and obviates the possible necessity of having to thrust an aspiration needle into the chest, which could very easily cause severe hæmorrhage from one of the dilated intercostal vessels.

Neither heparin nor dicoumarol is employed.

The patient should be sat up gradually to allow adequate time for cardiac compensation.

Coughing should be encouraged to prevent atelectasis.

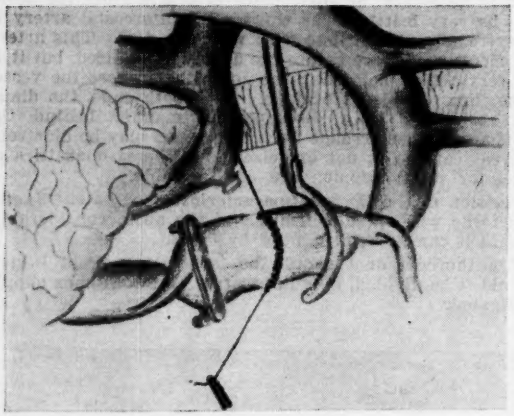

Figure IV.
View after insertion of posterior layer of aortic suture.

Should spreading thrombosis occur at the site of the anastomosis, it will make itself manifest on the third to fifth day by a severe pain in the back. This must be combated by the immediate administration of large amounts of heparin.

Description of Clamps.

The clamps which are suitable for one surgeon are frequently completely useless in the hands of another. Therefore, each surgeon embarking upon this type of work must give considerable thought to the question of clamps.

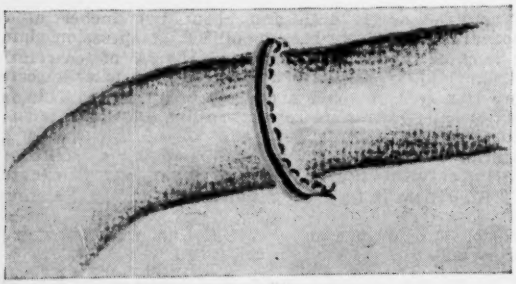

Figure V.

The clamps employed in the case described were of two types—a simple box clamp and a curved grooved clamp.

The principle of the simple box clamp is readily seen in the diagrams (Figures III and IV). This was made of hard brass. The approximating bars measured two inches by three-eighths of an inch. (This is a suitable size for adults; smaller sizes are needed for children.)

The curved grooved clamp is a suitable clamp if it is of a type having two approximating blades that are not too wide. The grooves, which are fairly coarse (three to the surface of the blade), run parallel to the blade. The grooves, together with the curve of the blades, prevent lateral as well as longitudinal slipping of the aorta. The curve of the clamp is of considerable help in encroaching onto the origin of the subclavian artery, and so gives the maximal length of aorta and the greatest amount of room for performing the anastomosis.

Reports of Cases.

Case I.—A male patient, aged twenty-one years, presented complaining of inability to continue his work because of headaches and dyspnœa. The dyspnœa had been noticeable for years, but was growing progressively worse. He noticed that all his life he had been unable to sit in one position for any length of time without discomfort in the legs. He frequently had aching knees following exercise.

The following observations were made on examination. The patient was seen to be a well-built, somewhat plethoric young man. There were no obvious anastomotic vessels or skin changes. The right and left radial pulses were both present; they were forceful, slow rising and sustained. The femoral, popliteal and *dorsalis pedis* pulses were all absent. The heart was of normal size, with a soft systolic bruit, best heard over the precordium in the mitral area. No machinery or other bruits were audible. The other systems were all normal. X-ray examination of the chest confirmed the normal size of the heart and did not indicate the site of

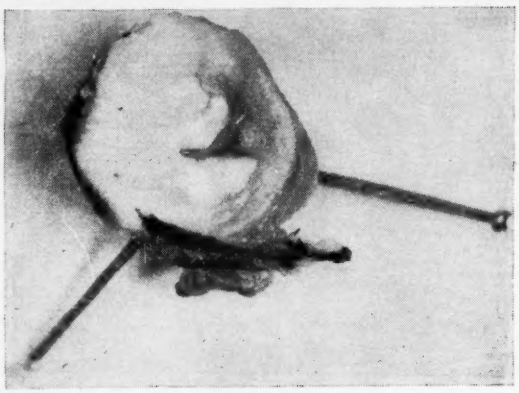

Figure VI.

coarctation. Notching of several ribs was apparent. The electrocardiographic findings were not significant. Renal function tests gave normal results.

On June 1, 1949, resection of the coarcted section was carried out. Blood transfusions were set up in the right arm and the left leg, it being essential to have two transfusions running and a transfusion pump available.

With the patient lying on the right side the usual postero-lateral incision was made. The fourth rib was completely excised. After adequate spreading of the ribs, it was found that there was no pleural space, owing to adhesion of the visceral and parietal pleuræ. This made exposure of the aortic arch somewhat difficult. A pronounced, ring-like constriction was seen three-quarters of an inch from the left subclavian artery, with enormously dilated and tortuous intercostal vessels. The distal portion of the aorta was slightly larger than the proximal portion. A patent *ductus arteriosus*, which joined the aorta to the right pulmonary artery, was observed. The operation was proceeded with as described. The *ductus arteriosus* was encircled by a ligature at either end. After these had been tied, adjacent transfixion sutures were inserted, between which the ductus was divided. Division of the ductus greatly facilitated mobilization of the arch of the aorta.

Difficulty was encountered with profuse hæmorrhage, owing to rupture of the third right intercostal artery. Four pints of blood were given in fifteen minutes at this stage. In spite of profuse hæmorrhage, the rate of replacement was such that the patient's pulse rate did not rise above 105 per minute, nor did the systolic blood pressure fall below 100 millimetres of mercury.

The aorta having been adequately mobilized, the clamps were applied as shown in Figure III. The constricted seg-

ment was then excised. By rotating the clamps as in Figure IV the approximated posterior walls were sutured with a continuous everting suture of number 00 "Mersilk". As the anterior wall was approached, the clamps were rotated backwards and the suturing was continued. After completion of the suturing, the clamps were slowly released in the manner already indicated. The aorta was allowed to fall into place and the mediastinal pleura was reconstituted. The lung was then distended before closure of the chest in layers.

Convalescence was slightly complicated by atelectasis of the upper lobe of the left lung. This was brought about by the handling necessary owing to the adhesions and by inadequate insistence upon coughing in the immediate post-operative period. There was some accumulation of blood in the chest, which required aspiration. Some huskiness of the voice occurred, indicating bruising of the recurrent laryngeal nerve.

The patient left hospital four weeks after operation. Normal radial, abdominal, femoral, popliteal and *dorsalis pedis* pulses were all palpable. The blood pressure in the arms was 130 millimetres of mercury, systolic, and 80 millimetres, diastolic, and in the legs 120 millimetres of mercury, systolic, and 70 millimetres, diastolic.

The patient said that in his opinion he was much less dyspnœic, had no headaches and was now able to sit for prolonged periods.

This case illustrates the following points: (i) The surgical treatment of a well-built young adult, who presents complaining of headaches and dyspnœa, and who has hypertension in the arms in the vicinity of 200 millimetres of mercury (systolic pressure). (ii) The absence of a machinery bruit does not exclude the presence of a patent *ductus arteriosus*. (iii) The anastomosis is not the most hazardous part of the operation. (v) A drain tube attached to a water-seal bottle is advisable.

CASE II.—A well-built female, aged thirty-six years, presented complaining of slight dyspnœa on walking up hills. She was able to walk considerable distances without effort. Her only other complaint was of oligomenorrhœa.

On examination, the patient was seen to have a high colour and a readiness to blush. Anastomotic vessels were palpable in the scapular regions. The radial, abdominal, femoral, popliteal and *dorsalis pedis* pulses were all palpable. The blood pressure readings were as follows: right arm, 190 millimetres of mercury, systolic, and 100 millimetres, diastolic; left arm, 180 millimetres of mercury, systolic, and 100 millimetres, diastolic; right leg, 180 millimetres of mercury, systolic, and 90 millimetres, diastolic; left leg, 170 millimetres of mercury, systolic, and 85 millimetres, diastolic. A systolic bruit was well heard over the aortic area and two inches to the left of the mid-line posteriorly, at the level of the fourth thoracic spine. Fluoroscopic examination revealed the heart to be of normal size; there was some enlargement of the ascending aorta with a small aortic knuckle. X-ray examination of the chest revealed notching of the ribs. The electrocardiograph examination revealed no significant abnormality.

This is a classical case of coarctation except for the presence of the pulses and of the high blood pressure in the legs.

Operation was decided against on the following grounds: (i) the patient's age, thirty years being the arbitrary limit set at the moment; (ii) the presence of the abdominal, femoral, popliteal and *dorsalis pedis* pulses, indicating an adequate flow to the distal part of the body by way of the collaterals; (iii) the presence of hypertension in the distal portion of the body; this probably results from prolonged renal ischæmia, so that the condition is now one of generalized hypertension in which the coarctation is but a part of the whole picture.

SUMMARY.

1. The types of coarctation of the aorta are enumerated.
2. The results of coarctation are indicated.
3. The clinical features are briefly described.
4. The methods of treatment are considered.
5. Selection of patients for surgical treatment is briefly indicated.
6. The method of resection and of anastomosis is described.
7. A brief description of the clamps used is given.
8. Illustrative cases are described.

Reports of Cases.

CHLOROPHYLL: A PRELIMINARY REPORT OF ITS USE IN TWO CASES OF SECOND AND THIRD DEGREE BURNS.

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A CONSIDERABLE amount of research work has been done, mainly in America, on the use of chlorophyll as a tissue stimulant. Its introduction to clinical surgery is comparatively recent. Morgan and others in America have used it for a number of chronic lesions, in most cases with dramatic results. Reports of these cases have been published in American journals as late as 1946 onwards.

As far as published reports go, no clinical work has been done with chlorophyll in the British field. It was first brought to my attention in the early part of 1947, after the publication of the results of laboratory experiments performed by Smith and Livingston in America.

Obtaining chlorophyll in England was at first found to be difficult, as it was completely unknown as a medical agent. Eventually a firm was discovered which produced it for commercial purposes. I am greatly indebted to Messrs. Potter and Clarke, Limited, of Artillery Lane, London, for their assistance in carrying out the early experimental clinical work.

It was not long after its first clinical trial that the potential of chlorophyll as a tissue stimulant became evident; and in the search for a variety of wounds to test it burns came to the fore with dramatic results. I have used chlorophyll widely in different types of burns, and I propose to describe two cases which typify its action and demonstrate its possibilities.

Case I.

A male patient, aged forty-five years, on the evening of June 28, 1949, fell asleep in his chair before a wood fire. Whilst asleep he fell forward into the fire, which came into contact with his face, his neck, the upper part of his chest and the anterior surface of his right arm. On his admission to Flinders Naval Hospital it was found that he had the following injuries: On his forehead, on the right side he had a second degree burn with blistering; on the left side he had a mixed second and third degree burn, mainly third degree. In the right eye, the upper lid had sustained a second degree burn, the lower lid a third degree burn and the inner angle of the lids a third degree burn. In the left eye, both lids and the inner angle were affected by a third degree burn. Both corneæ were undamaged. A second degree burn was present on the nose, except in the orbital areas. A second degree burn was present on the right cheek and a third degree burn on the left cheek. Both upper and lower lips were affected by a second degree burn; the mucous membrane was completely denuded. On the right side of the chin a second degree burn was present; on the left side, a second degree burn was found, becoming third degree laterally. The right ear was erythematous; a third degree burn was present on the raised areas of the left ear, the free margin being the worse affected. On the right side of the neck a second degree burn was present. On the left side, in the upper part a second degree burn was present and in the lower part a third degree burn. A third degree burn was present over an area of the chest extending from the anterior border of the trapezius around the root of the neck and over the front of the sternum to a point about three inches to the right of the sternum. Laterally the area extended to the junction of the outer and middle thirds of the clavicle, and then parallel to the root of the neck towards the right side. On the anterior surface of the right arm there was a second degree burn about two and a half inches by one and a half inches in area. In the

centre of this area was a third degree burn about one and a half inches by three-quarters of an inch in area.

Very little shock was evident, and no hæmoglobin concentration tests were considered necessary. The patient's injuries were washed with "Cetavlon" and all dead skin was removed where possible; the burn on his chest had a large central area of dead skin that could not be removed at the first "clean up". The whole area was dusted with penicillin and sulphonamide powder and dressed with "Vaseline" gauze. "Albucid" and penicillin drops were instilled into both eyes. Penicillin was given, 200,000 units intramuscularly *statim* and 50,000 units every four hours.

On June 29, 1949, the face and eyelids were very œdematous. The instillation of eye drops was continued. On July 1 the patient's general condition was improving. A seropurulent discharge was coming from both eyes, and there was a very offensive odour from the whole area affected. On July 2 his general condition was much improved. The condition of the right eye was better, but in the left eye much pus was present. On July 3 the face and chest were dressed; the area was cleansed with saline, penicillin and sulphonamide powder was dusted on, and a *tulle gras* dressing was applied. Atropine (2%) was instilled into each eye; an eye toilet was carried out every four hours, and penicillin eye drops were instilled every four hours. On July 4 a rash appeared on the trunk. "Benadryl", 50 milligrammes three times a day, was given. The penicillin dosage was reduced to 200,000 units twice a day. On July 5 the face was dressed. The whole area was scabbed over and an offensive seropurulent discharge was present. Sloughing skin on the chest was separating. Penicillin therapy was stopped. The eye toilet was continued. The corneas were intact. On July 9 a further dressing was carried out. The condition was improving, but there was no evidence of healing. "Benadryl" administration was stopped.

On July 12 the patient was first brought under my care. At the time of dressing all the exudate and scale were removed with normal saline. The area was granulating with a dirty slough in most places. A purulent discharge with an offensive odour was present on the left side of the face and chest. Gauze saturated in 5% chlorophyll solution was applied as a pack over the whole area, the left eye being closed. Two rubber catheters were incorporated into the chest dressing, as it was considered advisable to use an irrigated dressing which could be left in place longer. Irrigation with 2% chlorophyll solution was commenced, 20 millilitres being introduced into each tube every four hours.

On July 13 the face was redressed. It was noticed at this dressing after one day: (i) that the odour had almost entirely disappeared, much to the relief of the patient, who remarked on it; (ii) that the whole area was greatly improved, with diminution of the exudate; fine but visible epithelium was present over the right side of the face, chin and neck. On the left side healthy granulation tissue was present.

FIGURE I.

Photograph taken six days after the commencement of chlorophyll therapy, and twenty-one days after injury.

On July 14—two days after the first use of chlorophyll—it was noticed that the right side of the forehead, the cheek, the nose, both lips, the chin and the neck were covered with fine soft epithelium, with no evidence of scarring or contraction. On the chest thin epithelium covered the periphery of the area, about 50% of the whole, sloughed skin had almost entirely separated, and the rest of the area was covered with healthy granulation tissue, bright red and glistening. All the dressings were removed from the right side of the face except around the eyelids.

On July 15—after three days—the small third degree burn around the margins of the right eyelids had healed, with slight scarring at the inner margin. Ectropion was developing. Mucous membrane of the lips was present, but so soft that moisture from the mouth was causing maceration.

On July 16 the left cheek and most of the left side of the neck had healed. Fine soft epithelium was present, with no scarring and no contraction. The granulating surface was now limited to the left eyelids, the left ear and an irregular area between the eye and the ear about two inches square. The right side was fully healed, the skin being strong enough to permit shaving.

On July 18 the right ectropion was increasing and the left eye was affected by conjunctivitis. The chest area had healed except for a central area and two transverse bars in the skin folds of the neck, each about a quarter of an inch wide. The epithelium was raised above the surface in these areas. The left side of the forehead was healed. In the left eye, contraction of the upper lid was present. Irrigation of the chest was stopped.

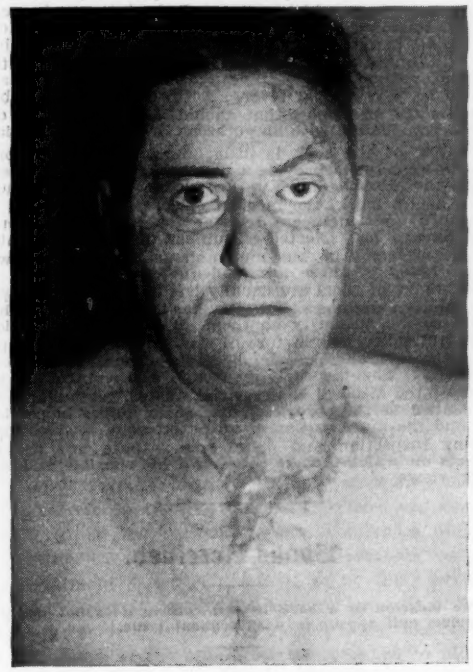

FIGURE II.

With the exception of the plastic repair of the right lower eyelid and the left upper and lower lids (carried out by another surgeon), this photograph shows the patient's condition on completion of the chlorophyll therapy, twenty-eight days from the commencement.

On July 20 the left ear had healed except at the apex and the lobe of the free margin. The chest area was 75% healed. The lips were healed, but very delicate. At operation, under "open ether" anæsthesia, a full-thickness skin graft was stitched to the upper and lower lids of the left eye. All raised epithelium was burnt down with a silver nitrate stick.

On July 22 the upper lid graft looked healthy, but the lower graft had failed. On July 24 both grafts were dead. The left ear had healed and the inner angle of the eyelids had healed. An area about the size of a florin at the outer angle of the left eye was still unhealed.

On July 25 the lower lid had healed to a strip one-eighth of an inch wide, and the upper lid had healed to a quarter-inch strip. Ectropion of the lower lid was developing, and contraction of the upper lid. On the chest an area one and a half inches by one inch was unhealed.

On July 28 the left lower lid had healed. On July 29 the left upper lid had healed, but contraction was occurring. On July 31 the neck had healed. On August 2 the chest area was almost healed. An area at the outer angle of the eye about the size of a shilling piece was healing. On August 4 the face was healed. On the chest the epithelium was raised over a small area; it was burnt down with silver nitrate. On August 8 the unhealed area on the chest had been reduced considerably.

On August 10, twenty-nine days after the first use of chlorophyll, with the exception of the upper and lower lids of the left eye and the lower lid of the right eye, the whole area was healed without scarring and almost without contraction. The skin was soft, pliable and non-adherent. The patient had been close shaving for the past ten days, even over the badly burnt area on the left side. The burnt area on the chest, though still visible, was almost indistinguishable from the normal skin. There was slight contraction of the skin at the root of the neck, but this was being reduced with massage and lanolin. He had bilateral ectropion, severe on the left side, and he could not fully close the left upper lid. He would require a plastic repair of this defect in the near future.

Gauze soaked in 5% chlorophyll solution was used throughout as a daily dressing, except where an irrigation dressing was applied.

The healing time was forty-three days from the accident and twenty-nine days from the first chlorophyll dressing.

Case II.

A male rating, aged nineteen years, on August 1, 1949, by accident poured a kettle of boiling water into the top of his boot. The injury consisted of a large second degree burn of the calf of his right leg, on the outer aspect, about four inches in diameter. The epidermis was denuded.

The area was cleansed thoroughly with "Cetavlon". A chlorophyll (5%) pack was applied. On August 3 the whole area was dry and healing. The centre was healed, only a small area at the periphery still being raw.

It is worthy of note that with chlorophyll the whole area of surface wounds heals at the one time and not from the margins inwards, as with the classical process of healing by granulation tissue.

On August 5 the central area had healed well. *Tulle gras* was applied over the healed area, and chlorophyll to the unhealed area.

It is important to cover healed areas with a harmless dressing in an extensive injury, otherwise the chlorophyll will cause heaping up of the epithelium. *Tulle gras* is excellent for this purpose.

On August 8 the area was fully epithelialized, but required a protective dressing, as the epithelium was very delicate. The patient was discharged to duty.

The healing time from the date of injury was seven days.

Comment.

The two cases reported here typify the action of chlorophyll; it can be most dramatic in its results. These are not isolated cases, but form part of a much larger series of every description of trauma.

The outstanding observation made, when chlorophyll is used, is in the nature of the healed surface. In every case there is a minimum of scar tissue, owing to the rapid rate of healing, and in time the surface becomes indistinguishable from normal skin.

It is possible that in the first case healing would have occurred much sooner in the major burnt area if sulphonamide powder had not been applied to the wound and if chlorophyll had been used at an earlier date. It has been proved experimentally that the sulphonamide compounds when applied to clean wounds retard the process of repair by as much as ten days. They should never be so applied. Their value given by mouth in proven cases of infection is beyond contradiction.

Whilst second in charge of a large casualty department in England, I gave up using sulphonamide powder as a primary dressing long ago, with much improvement in the rate of healing of non-infected wounds, and also of potentially infected wounds. Even in the presence of mild

infection the sulphonamides may do more harm than good. In any case chlorophyll does no harm and has a great power for good; it can control any potentially infected wound, but will not act in the presence of frank pus.

The time of healing in the second case (seven days) shows the superiority of chlorophyll in abolishing the lag period usually found in the treatment of trauma.

This research is being continued at Flinders Naval Hospital, and I hope to publish a fuller account in the near future.

Summary.

1. Two cases of burns treated with chlorophyll, one early and the other late, are reported in detail.

2. The rate of healing when chlorophyll is used is so rapid that its inclusion in the armamentarium of burn treatment is suggested; healing occurred in the first case in twenty-nine days, and in the second case in seven days.

3. The burnt surface heals with soft, pliable epithelium, with practically no scarring, and may be ultimately indistinguishable from normal epithelium.

4. Chlorophyll completely supersedes the sulphonamide compounds as a primary dressing for clean and potentially infected wounds.

5. Chlorophyll is a powerful deodorant.

Acknowledgements.

I wish here to thank Surgeon Captain D. A. Pritchard, Royal Australian Navy Director of Naval Medical Services, for permission to continue my clinical experiments in the application of chlorophyll in surgery, and Surgeon Captain L. Lockwood, Royal Australian Navy Senior Medical Officer, Flinders Naval Hospital, for permission to carry out these experiments at Flinders Naval Hospital. I am also indebted to the Naval Board for permission to publish this report.

Reviews.

PSYCHOLOGICAL TESTS.

In "The Clinical Application of Psychological Tests", Roy Schafer, M.A., attempts to formulate diagnostic conclusions in respect of the various neuroses and psychoses from a battery of psychological tests composed of the Wechsler-Bellevue intelligence scale, the Rorschach test, the thematic apperception test, sorting test of concept formation, a word association test and a test of memory efficiency.[1]

The book is caviare to the general practitioner. It presupposes complete familiarity with the various tests, rarely used except by the clinical psychologist.

The author tends to disarm criticism of what may be considered an over-ambitious attempt to provide definite diagnostic conclusions by tests which are to some extent incompletely standardized, or are themselves subject to subjective interpretation by the examiner. He states in italics: "The indications should be understood to refer to characteristics first and to diagnosis second."

The book consists of two main divisions. The first division entitled "Diagnostic Summaries" provides a description of the type of test results likely to be found in various mental disorders. Such results, of course, are mainly comparative, and as the author points out, "the decision as to where a 'normal' characteristic ends and where a 'neurotic' one begins is most difficult. Diagnosing a case as falling within the normal range on the basis of test results is largely a matter of exclusion of the various pathological possibilities".

The second division comprises a series of case studies, the actual results obtained in each of the tests, seen against the background of a brief clinical history. The test results are then analysed and a diagnostic conclusion is reached. Unfortunately, the cases chosen appear to present little difficulty in diagnosis on clinical grounds alone. It would have been interesting to include a series of cases of doubtful normality or doubtful diagnosis.

The book holds promise for the future, when such tests will probably be a valuable ancillary guide to the psychiatrist; but in our present state of knowledge most attention must be paid to the "test of life" as the most valuable diagnostic test. "It seems advisable", writes the author, "to carry on individual psychological testing only in a setting that includes independent clinical investigation."

[1] "The Clinical Application of Psychological Tests: Diagnostic Summaries and Case Studies", by Roy Schafer, M.A.; foreword by David Rapaport, Ph.D.; 1949. New York: International Universities Press, Incorporated. London: George Allen and Unwin, Limited. 9" x 6", pp. 346. Price: 30s.

PUBLIC HEALTH PROBLEMS.

In the second edition of "Practical Public Health Problems" Sir William Savage has made several useful additions to his small book.[1] A more general and more useful discussion on hygienic food control replaces the chapter on *The Food and Drugs Act*, 1938, which was of little interest to readers outside England. The discussion of the putrefaction of food and the control of communal eating places has a general application. Another new chapter presents an excellent outline of the investigation of an outbreak of typhoid or paratyphoid fever. A third new chapter briefly discusses the principles that should guide a medical officer of health in dealing with an outbreak of an infectious disease.

The rest of the book is little changed. The author has made no attempt to provide a text-book. He has written for those who already have a knowledge and experience of public health work, the medical officers of health and their inspectors and engineers. After long experience in this work Savage has selected a number of the important and difficult problems he has met, and set down his views on them. Many of these are inadequately discussed in text-books. Some of them are usually left to the health inspector or sanitary engineer, but the medical officer of health should be the authority on them all. The book provides a useful refresher course for all who are engaged in public health work, whether as medical officers, inspectors or engineers. The disposal of sewage and control of water supplies; the disposal of industrial wastes, particularly milk; the control of the spread of disease by milk; inspection of food and the investigation of an outbreak of food poisoning; housing inspection and disinfection; these are the other subjects on which Savage sets down his sensible and stimulating views.

[1] "Practical Public Health Problems", by Sir William Savage, B.Sc., M.D.; Second Edition; 1949. London: J. and A. Churchill, Limited. 8½" x 5", pp. 212, with three illustrations. Price: 14s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Handbook of Surgical Urology for Internes, Hospital Corpsmen and Nurses", by Nelse F. Ockerblad, M.D., F.A.C.S.; 1949. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson. 7½" x 5½", pp. 206, with 52 illustrations. Price: £1 12s. 3d.

Written in simple terms with the aim of making better urological assistants.

"Gynæcology", by Herbert H. Schlink, M.B., Ch.M. (Sydney), F.R.A.C.S., F.R.G.S., Clement L. Chapman, D.S.O., V.D., Med. des Epid., M.B., Ch.M. (Sydney), F.R.C.S. (England), F.R.C.S. (Edinburgh), F.R.A.C.S., George G. G. L. Stening, E.D., M.B., B.S. (Sydney), F.R.C.S. (Edinburgh), F.R.A.C.S., M.R.C.O.G. (England), and Frederick N. Chenhall, M.B., B.S. (Sydney), FR.C.S. (England), M.R.C.P. (Ireland), F.R.A.C.S.; Second Edition revised; 1949. Sydney and London: Angus and Robertson, Limited. 8¾" x 6", pp. 668, with 198 illustrations. Price: 67s. 6d.

A completely revised edition of a text-book intended primarily for students, three new authors collaborating with the original author.

"Hearing Tests and Hearing Instruments", by Leland A. Watson and Thomas Tolan, M.D.; 1949. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson. 9" x 6¾", pp. 612, with 239 illustrations. Price: £3 15s. 3d.

Intended to be a "comprehensive and primarily practical text on hearing instruments and their application".

The Medical Journal of Australia

SATURDAY, MARCH 11, 1950.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE MENTAL HOSPITALS OF NEW SOUTH WALES.

ONCE more the mental hospitals of New South Wales must come under criticism. For many years the annual report of the Inspector-General of Mental Hospitals has been the subject of comment in these columns. One of the functions of this journal is to keep the medical profession and the public informed on the progress, or on the static qualities, of the mental hospital services in the several States. The duty is not particularly pleasant, but it has to be faced. As stated on previous occasions, mental hospitals remain in relative obscurity. There are several reasons for this—the patients in most instances are not in a position to make intelligent observations on the general treatment meted out to them or on their environment, and their relatives and friends are ignorant of what is going on, or if they have any knowledge, hesitate to reveal it because of the stupid stigma attached to mental illness. The document for consideration on this occasion is the report of the Inspector-General of Mental Hospitals of New South Wales for the year ended June 30, 1948. This report was presented to Parliament in accordance with the requirements of the *Lunacy Act* and was ordered to be printed on June 7, 1949; it was distributed in January, 1950. In any dissection of reports of this kind official delay in publication must always be borne in mind.

The report opens with a statement on the number of patients admitted during the year. The number of new admissions, 1451, was 39 more than those for the previous year. It is pointed out that, though during the past ten years there has been only a relatively small increase in the total number of patients admitted, there has been a considerable increase in the number of female patients admitted. The number of voluntary patients admitted to all hospitals of the department totalled 1322 (535 males and 787 females). This total is 142 greater than that of the previous year. There is need for increased accommodation for the nursing of voluntary patients who require early and intensive treatment. To meet this need two projects have been approved—the construction of two neuro-psychiatric clinics, one of which shall be for children, with residences for nurses and medical officers. The total number of patients in residence, including voluntary patients and inebriates, was 11,171; accommodation was available for only 9785. In one or two hospitals all the accommodation was not occupied. The hospitals which were overcrowded contained an excess of 1534 patients. One of the Department's troubles has to do with the disposition of senile patients. On previous occasions it has been pointed out that the Department has not been successful in providing a separate institution for the accommodation of senile patients (in the report they are "cases"). The greater number of these patients are being sent to Rydalmere Hospital. Of 99 patients admitted to this hospital 57 were above the age of sixty years. The Director-General refrains from publishing any of the harrowing details that have been a feature of the reports of earlier years—we can imagine that life is still just as unpleasant for some of these unfortunate patients as it was. The Director-General states that for many years he has drawn attention to the serious congestion that exists. He adds—perhaps in cold resignation to his inability to bring about the changes known by him to be necessary—that a building programme has been approved and that the Government has provided the requisite funds; when the programme has been implemented the present difficulties will be overcome. It may perhaps be somewhat lugubrious to point out that by that time other difficulties will have arisen. The building programme includes the erection of a new metropolitan hospital at North Ryde to accommodate more than 1000 patients; the cost will exceed £2,000,000, and an enabling bill has been approved by Parliament. A survey of the area to be built on is being made and on completion the contour plan will be prepared. (This is one of the statements in regard to which we must remember that the report covers a period which closed more than eighteen months ago.) A mental hospital of the farm colony type for approximately 2000 male mental defectives has been planned and an area of 3466 acres has been selected as its site. The Director-General anticipates that in regard to the establishment and administration of these two hospitals the knowledge gained by his Deputy Inspector-General from an official visit to England and America will prove of great value. Medical practitioners interested in mental hygiene will hope that the Director-General's anticipation will be fulfilled. Some, however, mindful of the enormous difficulties associated with building of any kind, will anticipate that another visit of the Deputy Director-General to overseas centres will be needed by the time these hospitals are ready for occupation. Mention must be made of the proposed neuro-psychiatric clinics. The clinic for children which it is intended to erect near Broughton Hall, presumably as part of its organization, is to be commended. The proposal to erect another neuro-psychiatric clinic on a site adjacent to Broughton Hall needs consideration. An alternative with a great deal in its favour is that the clinic should be built near a general hospital and that it should include an up-to-date reception house. The present Reception House is an antiquated affair, its accommodation is too restricted and it has little in the way of diagnostic and therapeutic facilities. The report contains a list of major construction works which have been "approved" in connexion with hospitals

that are named. "In a number of cases" the work is in progress, but no indication is given of their identity.

The interest of medical readers of the report will be taken by the tables setting out the results of electric convulsive therapy. In these tables, occupying seven pages, such conditions as *dementia paralytica*, congenital mental deficiency and epilepsy are included, and we regret to notice that some of the percentages of recoveries are reported in series containing one case. The calculation of percentages for recoveries, improvements or anything else when small numbers of cases are involved cannot be described as being of any value. Such a presentation will not appeal to the critical mind, especially in the present instance in which one of the tables (II) would lead us to believe that the recovery rate (calculated, it may be noted, on admissions and readmissions grouped together) has fallen during the last twenty years. Some figures regarding the effect of convulsion therapy on the length of a patient's stay in hospital might lessen the unfavourable impression created by Table II, which is not likely to encourage those who have to vote sums of money for the maintenance of mental hospitals. The cost of these institutions is enormous. The total cost of maintenance of patients has nearly doubled in ten years. In 1947-1948 it was £1,400,231; the net annual cost per patient was £108 4s. 8d., and this was £25 above the cost of the previous year. No doubt the kind of information published in these reports is determined by statutory requirements; but it does appear that a good deal of the seven pages covered by the results of electric convulsion therapy might well be devoted to a scientific review of convulsion therapy and that mention might be made of other methods of treatment used in the department, such as pyrexial and penicillin therapy, the use of insulin coma and so on. Further, the legal difficulties in the way of subjecting departmental patients to frontal leucotomy might well be ventilated in order that parliamentary and possibly public support for reform might be enlisted. Other matters, on which some detail might be given in this report, have to do with the medical staffing of the various hospitals; at present medical officers are classed with managers and other senior lay personnel as "administrative" and their number in the several institutions cannot be determined. Papers published by the medical staff and investigations and experimental treatments are officially neglected in this report. We find no reference to certain out-patient work carried out by some of the medical officers, or to the provision of demonstrations to medical students, or to the departmental and general clinical meetings which are held from time to time. We cannot discover from their report how many medical officers obtain the Diploma in Psychological Medicine, or how many nurses obtain their certificates in general and mental nursing. There is no doubt that greater recognition of the human aspects of mental hospital administration would be an encouragement to hospital staffs and possibly to the general public.

The Director-General states that the Deputy Director-General will furnish to the Government a report based on his observations during his official visit overseas. We may expect that some of these observations will be reflected in the report that will be published in twelve months' time. Indeed in the light of these observations it would be appropriate for the Director-General to review the mental state of the community and the provisions, including extramural organizations, that are made for mental invalids.

Current Comment.

MORE ABOUT CHLORAMPHENICOL.

CHLORAMPHENICOL, until recently known generally by its proprietary name "Chloromycetin", was discussed in a congress paper read by J. F. Funder at Perth in August, 1948, and subsequently published in this journal on May 7, 1949. Some of the early important work on the antibiotic, especially its efficacy in the treatment of scrub typhus, was considered in these columns on September 18, 1948, and subsequent developments were discussed on November 19, 1949, perhaps the most important being summed up in the statement then made: "Chloromycetin now appears to be the drug of choice for enteric infections." Thus the therapeutic value of chloramphenicol has been clearly demonstrated in certain rickettsial infections and in typhoid fever; confirmatory reports from Australian sources of its usefulness in the latter condition are now being added to those from elsewhere. Another organism which has been found to be sensitive to chloramphenicol *in vitro* in low concentrations is *Hæmophilus pertussis*, and hopes have been aroused that this may be turned to good account clinically. Encouraging results have been obtained by E. H. Payne *et alii*[1] in America in a series of 50 cases, and by J. D. Gray[2] in England, though the findings are not conclusive. Gray, in particular, makes no attempt to assess the value of the drug in whooping-cough for a number of good reasons, though he was able to work out satisfactory oral dosage schedules. However, he has felt constrained to publish the account of his investigation at a stage that would otherwise be premature, because of certain pieces of factual information that he has come upon. The most striking of these was complete sterilization of the mucous surfaces of the upper part of the respiratory tract; an "indiscriminate bacterial holocaust" was produced within an hour of a single dose of chloramphenicol, and a period of at least seventy-two hours was required for the flora to return to normal. It seems likely that this sterility can be maintained indefinitely by continued administration of the drug, and though there appear to be exceptions to its complete occurrence, the finding may well be of great value in surgery, especially if the sterilization is found to extend into the lungs. Another important occurrence noted was an intense allergic reaction (giant urticaria, asthma and cyanosis) which followed a single dose of the drug and lasted for about five hours. Since the child affected could not have had previous access to the drug, Gray suggests that the sensitivity was due to massive bacterial death and that the possibility of similar happenings must be borne in mind, especially if massive doses of chloramphenicol are given. Large dosage was found also to induce muscular changes. Among the treated children given massive doses, those who were old enough to notice visual symptoms developed a peculiar internal ophthalmoplegia characterized by rapid fatigue of accommodation on reading, with recovery after a short rest. This was thought to be a peripheral effect. Experiments with adults confirmed the existence of this side action, and weight-holding tests showed that chloramphenicol hastens the onset of fatigue in skeletal muscles. The basis of this is by no means clear as yet, but Gray draws attention to one important possibility, the extension of this fatigue syndrome to the myocardium—a particularly serious matter, if it does occur, among the elderly, those with heart disease and those with toxic conditions. Another question which Gray brings forward is the possibility

[1] *The Journal of the American Medical Association*, December 31, 1949.
[2] *The Lancet*, January 28, 1950.

that similar sterility to that induced in the upper part of the respiratory tract may occur in the gut, with consequent interference with the synthesis of vitamin *K* in infants. These are matters of great practical importance in the use of this potent antibiotic agent; further research is urgent, and the results will be awaited with much interest.

Those who are seeking a comprehensive and authoritative practical account of chloramphenicol, apart from the new possibilities opened up by Gray's work, will find it in an article by Joseph E. Smadel,[1] whose name has, of course, been associated with all the significant pioneer work on this antibiotic. He describes the history of chloramphenicol, which, originally obtained from the fermentation products of the mould *Streptomyces venezuelæ*, is now being produced synthetically on a practical basis. He reviews laboratory investigations that have been carried out and the methods used, and presents a detailed summary of the results of the drug's experimental use *in vivo* and *in vitro*, going on to discuss its clinical use, in which it has proved a highly effective therapeutic agent against a number of infectious diseases of man, notably the rickettsial diseases, typhoid fever, brucellosis and gonorrhœa, with other important possibilities. No serious toxic manifestations as a result of chloramphenicol therapy have reached Smadel's notice, but, as he points out, the drug is only now coming into wide usage and careful search for such manifestations should be continued. Gray's more recent report is important in this regard. Smadel makes an interesting comparison between the experimental data summarized in his article and those applying to aureomycin, drawing attention to the "amazing similarity" in the therapeutic effectiveness of the two antibiotics in a wide range of infections. Despite these similarities, he states, the two are not identical. The simplicity of chemical structure of chloramphenicol and its synthesis on a commercial scale do not apply to aureomycin. Chloramphenicol is a specific for typhoid fever, while aureomycin is not. Neither drug appears to be dangerously toxic, but annoying reactions more frequently follow aureomycin than chloramphenicol therapy. As Smadel remarks, the medical world is fortunate in having acquired within the past two years two such valuable antibiotics; the limits of application of both have not yet been reached.

MEDICAL CERTIFICATES.

MEDICAL CERTIFICATION is an important part of the activities of almost every medical practitioner; it may be very time-consuming; it may be unnecessary. Australian practitioners know from experience that as controls are set up, as, for example, in war time, medical certificates are more often sought than in normal times. With government service of one kind and another certificates of many kinds are needed and we can well imagine that in a national health service under departmental control the writing of certificates by doctors would be likely to take the doctor from his proper work of attending to his patients' illnesses. By all accounts the members of the profession in England are far from happy about the demands made on them for certificates. Evidence of this is afforded by the appearance of a report on medical certificates by an interdepartmental committee.[2]

The chairman of the committee was Mr. Archibald Safford, K.C. The committee was appointed "to consider the medical certificates required under present enactments or regulations or for other administrative purposes and to advise, without excluding the possibility of amending legislation, how far it would be practicable to reduce the number of certificates to be signed by medical practitioners and to improve and simplify the forms of certificate and the rules governing their use". In our account of the committee's findings reference will be made only to those aspects likely to interest Australian practitioners or to have a bearing on their practices.

The members of the committee came to the conclusion that many of the documents laid before them were not medical certificates in the ordinary sense of those words; some were medical reports and others were mere notifications, attestations or statements. Some of the documents were something more than certificates since they included medical reports with the certificates. In regard to the documents required by certain acts, it would, we are told, be necessary in the last resort for the courts to determine whether a particular document was a certificate within the meaning of the subsections. The view is expressed that a certificate ceases to be merely a certificate in the ordinary sense of the word when a doctor is required to report upon specified clinical details that he has observed, or the complaints made to him by, or on behalf of, the patient. Further, if a document is designed to enable a third party with medical knowledge to form an independent opinion as to the person's state of health without seeing that person, the document is something more than a certificate, even though it may include a certificate. In some of the forms the committee noticed such expressions as: "I have formed this opinion upon the following grounds." In its view the expression is one which should in future be avoided, unless it is intended that the document should enable a third party with medical knowledge to form an independent opinion. Clearly such a document should not be used when all that is required is a statement about the patient's physical and mental health. The suggestion is made that confusion in the minds of medical practitioners would be avoided if it was made clear that only a diagnosis of the patient's disease or disablement was required. Another statement made, the truth of which is obvious, is that a document which a doctor is authorized to sign as an attesting witness is not a certificate; he signs it only as a responsible member of the public.

Some observations are made on the form of certificate. "It is of great assistance to a person called upon to complete a document if he is familiar with its lay-out." The chief advantage is the saving of time. Anything that will not add a burden to the unavoidable clerical aspect of a doctor's duties should be welcomed. There seems to be no reason why a common type of certificate could not be devised; if necessary paper of different colours could be used when a common type of certificate was drafted for different government departments or for different organizations. The committee states that in the future when new forms of certificates are prepared it is desirable that advice and assistance should be obtained from some joint committee representative of medical and other interests with legal guidance available to them. As a matter of fact the committee has made a short résumé of acts, regulations, orders in council and other provisions which give rise to demands for medical certificates and other documents which doctors are called on to sign. This should be useful to government departments if they cared to bring about some uniformity in the layout of certificates.

The fact which has constantly to be borne in mind is that "the doctor's function in relation to the signing of certificates is to provide evidence of medical facts or inferences and does not extend to a general assurance that the application or other matter in respect of which such a certificate is used is founded on a true presentation of the other facts of the case". Again, in reply to some questions on a form, a doctor must reply on what the patient tells him and cannot base his reply on his own knowledge. For example, the question, "Are the patient's menstrual periods regular and normal", is much better put: "Does the candidate state that her menstrual periods . . ."

In conclusion, it may be pointed out that when a medical practitioner has to spend an unduly long time on clerical work, not only is it a hardship to him, but it also is to the disadvantage of his patients, because he cannot give the length of time to the investigation of their problems that he would like to give. The whole question might well be reviewed from the Australian point of view.

[1] *The American Journal of Medicine*, November, 1949.

[2] Report of the Inter-Departmental Committee on Medical Certificates; Ministry of Health, Department of Health for Scotland; 1949. London: His Majesty's Stationery Office. 10″ × 6″, pp. 104. Price: 2s. net.

Abstracts from Medical Literature.

SURGERY.

Thymectomy in Myasthenia Gravis.

L. M. EATON *et alii* (*Archives of Neurology and Psychiatry*, May, 1949) present the results obtained in the treatment of 15 patients who had *myasthenia gravis* and associated thymic tumour, and in 17 patients without thymic tumour, all of whom underwent thymectomy. They state that 60% of the patients were improved four and a half years to one-half year after operation, but consider that these results, though encouraging, must not be looked on as conclusive evidence that the treatment is of value, as the possibility of spontaneous remission in the course of *myasthenia gravis* cannot be excluded with sufficient certainty.

Streptomycin in Skeletal Tuberculosis.

WILLIAM H. BICKEL (*Surgery, Gynecology and Obstetrics*, August, 1949) states that streptomycin and its derivatives are really effective weapons for use in the treatment of bone and joint tuberculosis. He admits that any observations must be made with caution as tuberculosis in and about bones is a slow unrelenting process. To date, the best results from the use of streptomycin in the treatment of tuberculosis of bone and allied structures have been in early tuberculosis of the soft tissues and synovia before bony involvement or soft tissue fibrosis has developed. At this time, the diagnosis may be in doubt and it should be proved by biopsy, culture and animal inoculation. In several proved cases of synovial tuberculosis, a second biopsy after a course of streptomycin therapy has yielded no evidence of tuberculosis. Fulminating open lesions of the extremities have been seen to return to a nearly normal state after a course of streptomycin. The treatment of tuberculosis of a weight-bearing joint is more difficult than that of a non-weight-bearing joint, on which the demand is not so exacting. For weight-bearing joints early diagnosis is especially important, and streptomycin therapy should be instituted while the infection is limited to the synovia and cartilaginous margins of the joint. These joints can and have been salvaged and their functions retained. Traditionally, rest is indicated in the cure of tuberculosis. In practice more hyperæmia and active dispersal of streptomycin throughout the joint and its adjacent structures may occur when active motion without weight-bearing is allowed. In cases under the author's own observations, the joint has been less stiff after treatment is stopped if it is allowed to be mobile during treatment. Streptomycin can be considered only as an adjunct to surgical treatment, when the articular surfaces are sufficiently destroyed, so that even if the tuberculosis was arrested, traumatic arthritis would be present. Pre-operative streptomycin therapy has allowed excision of fulminating tuberculosis of joints in which the chances of success were slight. Treatment with streptomycin also seems to have lessened the danger of disseminated tuberculosis, and mixed infections do not appear to be as common before operation as formerly. In lesions of non-weight-bearing joints, it does not appear that arthrodesis will need to be recommended as frequently as it was before streptomycin was available. There is some reservation to this statement, as in some cases a period of arrest followed by reactivation in a year or two has been noted. This reactivation may or may not be controlled by a second course of streptomycin, and the danger of the appearance of strains of tubercle bacilli resistant to streptomycin has to be considered in these cases. Tuberculosis of the spinal column presents a more difficult problem of analysis. Critical evaluation of destruction and repair can vary within wide limits. Conclusions on results must form slowly because of the nature of the disease itself. Thus far, preliminary surveys are favourable. If the disease is fairly advanced, startling results cannot be expected; however, the disease is serious enough to warrant the use of all modes of treatment including streptomycin. The exact place of streptomycin in the treatment of tuberculosis of bone and allied structures is not known yet. At the end of the next decade of study its place should be better evaluated.

Thyreoidectomy and Thyreotropic Exophthalmos.

HUGH RYAN (*The British Journal of Ophthalmology*, December, 1949) reviewed 1001 cases of thyreoidectomy with the view to determining the incidence of post-operative thyreotropic exophthalmos. A *questionnaire* was sent to 1001 patients and satisfactory replies were received from 584. Only three cases of thyreotropic exophthalmos of mild degree were found in the series. The author comments that these findings do not confirm the impression gained from the literature that thyreotropic exophthalmos is a common sequel to thyreoidectomy.

Suture of Peripheral Nerves.

J. W. KIRKLIN, F. MURPHEY AND J. BERKSON (*Surgery, Gynecology and Obstetrics*, June, 1949) have analysed 755 neurorrhaphies in an endeavour to determine the factors affecting progress. The best results were obtained when an accurate neurorrhaphy was carried out within three months of injury. This was particularly so when motor function, and that of small muscles, was concerned. The more peripheral the lesion, the better the prognosis—especially for motor function. The recovery of sensory function in high lesions of the sciatic nerve was always poor. The presence of a large gap between the nerve ends was no barrier to some recovery. No better results were observed in those cases in which tantalum foil was wrapped about the suture line. The authors state that it is important to obtain good fasciculi in both proximal and distal ends of the nerve. They had frozen sections of the nerves made before neurorrhaphy. If the gap is such that, despite extensive neurolysis, two healthy ends cannot be secured, then the distal end should be resected until good funiculi can be seen and the proximal end resected as far as possible. The impression was gained that some tension at the suture line does not preclude a good result. Any fine non-absorbable material will yield good results. It is desirable to have a few radio-opaque sutures on either end of the nerve for later radiographic check. There was no observed superiority in the use of autogenous grafts to close gaps in nerves to extensive nerve mobilization and end-to-end suture.

Parkinsonism and Interruption of Sympathetic Nerve Supply to Brain.

W. J. GARDNER and GUY H. WILLIAMS (*Archives of Neurology and Psychiatry*, April, 1949) discuss the result of resection of the superior cervical sympathetic ganglia on both sides in Parkinson's syndrome. This operation was performed in 34 cases, and there was little objective improvement and only slight subjective improvement in a few cases.

Percutaneous Cerebral Angiography and Cerebral Abscess.

H. F. FABRITIUS, A. G. FRØVIG and K. KRISTIANSEN (*Archives of Neurology and Psychiatry*, April, 1949) discuss the diagnosis and treatment of cerebral abscess. In three of their eight cases the abscesses were multiple. They emphasize the value of percutaneous cerebral angiography in the localization and follow-up of the abscess. They regard this procedure as harmless and simple enough to allow repeated examinations. If an abscess is present it shows dislocated vessels, and the amount of dislocation is dependent on the size of the abscess. Their treatment is conservative, consisting of the systemic administration of penicillin and sulphadiazine, the aspiration of pus and the local injection of penicillin into the abscess cavity. They also inject the abscess cavity with air to visualize the site and shape of the lesion. Phenobarbital is given for at least a year after the patient's recovery.

Traction Injuries of the Brachial Plexus in Adults.

R. BARNES (*The Journal of Bone and Joint Surgery*, February, 1949) reviews 63 cases of closed injuries of the brachial plexus in adults. He states that motor-cycle accidents are responsible for most traction injuries of the brachial plexus. When the shoulder is forcibly depressed with the arm by the side, the greater stress falls on the upper roots. When the abducted limb is forced behind the trunk and the head is thrust towards the opposite side, tension is exerted on all roots of the plexus. The tension on each root varies with the position of the limb: elevation increases tension on the lower roots; adduction increases tension on the upper roots. These observations are in accord with clinical findings, for lesions of the whole plexus may be divided into three types: (i) lesions with permanent paralysis of all muscles of the limb; (ii) lesions in which there is early return of voluntary power in muscles innervated by the lower roots, and no recovery in muscles innervated by the upper roots; (iii) lesions in which there is late return of voluntary power in muscles innervated by the upper roots, and no recovery in muscles innervated by the lower roots. The author states that substantial stretching of nerve roots is possible before actual rupture occurs. Operative findings support this. The author believes that clinical examination cannot show

the prospects of recovery in degenerative lesions of the nerve roots. The clinical pictures of a degenerative lesion of the axons, a lesion with rupture of axons and intraneural scarring, and a complete rupture of the nerve root, are identical. Traction injuries of the brachial plexus may be divided into four main groups: (i) lesions of the fifth and sixth cervical nerves; (ii) lesions of the fifth, sixth and seventh cervical nerves; (iii) lesions of the whole plexus; (iv) lesions of the seventh and eighth cervical and first thoracic nerves. Pain is an unfavourable prognostic sign. Œdema is always troublesome when paralysis is extensive and, unless prevented, causes rapidly increasing stiffness of the joints. Many lesions of the plexus recover satisfactorily if meticulous attention is given to details of conservative treatment. Non-degenerative lesions always recover quickly and completely. They are distinguished easily from degenerative lesions by persistence of normal electrical reactions for longer than eighteen days after injury and by little or no sensory loss in the corresponding areas. In degenerative lesions of the author's series, pattern of recovery was fairly constant; lesions of the fifth and sixth cervical nerve roots recovered well, whereas some residual palsy was inevitable in lesions of the whole plexus. The author points out that in neglected injuries of the brachial plexus, joint contracture often causes more disability than muscular paralysis. Œdema is proportionate to the severity of injury and is the main cause of joint stiffness; it must be prevented by elevating the limb, usually on an abduction splint. All joints should be put through a full range of movement several times a day. Continuous stretching of the paralysed muscles is prevented by appropriate splinting. Daily galvanic stimulation will prevent excessive wasting of the paralysed muscles. During the recovery phase muscles which show feeble voluntary contraction must be reeducated. Prolonged treatment may be necessary.

The Fate of Voluntary Muscle after Vascular Injury in Man.

R. E. M. BOWDEN (*The Journal of Bone and Joint Surgery*, August, 1949) states that biopsies of muscle were taken during the course of operation from 16 patients with vascular injuries to the limbs. The following three types of histological changes were found: (i) massive necrosis of muscle fibres, associated in all cases with serious damage to the main artery of the limb or to the vessel supplying the affected muscles; (ii) dense interstitial fibrosis, the muscle fibres sometimes being normal and sometimes showing necrosis or denervation; the vascular injury varied from severance of the vessels by gunshot wounds to trivial damage, causing slow hæmorrhage within fascial-bound spaces; (iii) scattered foci of necrosis with patchy interstitial fibrosis, due to the pressure of tight plaster applications, crushing of the limb, fractures with arterial contusion, or slow hæmorrhage or extravascular transfusion within fascial planes. The author states that the vulnerability of certain muscles to vascular damage is partly related to the intramuscular vascular pattern, of which the following five types have been described: (i) a longitudinal anastomotic chain entering the muscle throughout most of its length, an arrangement found in the soleus and *peroneus longus*; (ii) a longitudinal pattern of vessels derived from a single group of arteries arising from a common stem and entering the muscle at one end, as in the gastrocnemius, a muscle notoriously susceptible to ischæmia and therefore to clostridial infection; (iii) radiating vessels arising from a single nutrient artery, which enters the middle part of the muscle, as in the *biceps brachii*; (iv) a series of anastomotic loops throughout the length of the muscle, the vessels being derived from a succession of arteries entering the muscle at different levels, an arrangement found in the *tibialis anterior*, the *extensor hallucis longus* and the long flexors of the toes; (v) sparse anastomoses arranged in an open quadrilateral pattern. The author states that in ischæmic muscles the intramuscular nerve trunks may be normal or they may show evidence of degeneration or necrosis; but in favourable circumstances there may be regeneration of axons. In some cases evidence is found of regeneration of muscle fibres in man, the regeneration being dependent to some extent upon the efficiency of intramuscular anastomoses. The prognosis, in cases of ischæmia of human voluntary muscle, depends upon the extent and the reversibility of damage to both muscle and nerve fibres and upon the extent of regeneration of muscle fibres.

Hand Infections.

G. P. ARDEN, A. P. KITCHIN and H. D. W. POWELL (*The Lancet*, July 30, 1949) analyse the results of treatment in 100 cases of hand infection. In 55 cases the technique of excision and suture was used. The authors consider this technique a valuable step forward in the treatment of hand infections, claiming that it reduces the disability period and ensures greater comfort for the patient and that it can be used with advantage in any busy casualty department once the principles are fully understood. The authors agree that immobilization of the hand is of great importance and that chemotherapy is of considerable value in preventing and controlling serious complications, but of less certain value in well localized infection of the hand. In their view there is no place for rubber drains, hot foments, soaks, dry heat and similar measures in the treatment of hand infections.

Post-operative Paralysis of the Arm.

M. R. EWING (*The Lancet*, January 21, 1950) reports five cases of upper-arm paralysis following operation. In two cases there was a partial brachial plexus lesion and in one of them it was bilateral. Recovery was in all cases almost complete within a few months. The author suggests that the wide use of curare may be partly responsible for the present prevalence of this complication. He discusses the various mechanisms of the injury and presents evidence that in this respect abduction of the arm with the patient in the Trendelenburg position is a particularly dangerous manœuvre.

LESLIE G. KILOH (*ibidem*) describes four cases of brachial-plexus lesions noted immediately after cholecystectomy and reviews the possible factors underlying the production of such lesions during anæsthesia. He states that the two main theories of their causation—pressure and traction—are not mutually exclusive, and that in most cases the plexus has probably been submitted to both. He considers that the horizontal posture in itself is no safeguard against brachial-plexus lesions and that abduction of the arms, particularly when associated with extension and external rotation, is potentially dangerous. It is suggested that the greater relaxation obtained with curare and similar drugs may in part be responsible for some increase in the incidence of brachial-plexus injuries.

Risks of Surgery in Congenital Heart Disease.

R. ADAMS (*Diseases of the Chest*, October, 1949), discussing the optimum age for surgery in congenital heart disease, states that in terms of vascular surgery the vessels are three times the chronological age; that is, an operation on the aorta of a person aged twenty-five years carries the operative risk that a gastrectomy or pneumonectomy or similar major procedure would carry in a person aged seventy-five years.

Subphrenic Abscess.

H. R. S. HARLEY (*Thorax*, March, 1949) reviews a series of 182 cases of subphrenic abscess. Only one intraperitoneal subphrenic space is recognized above the right lobe of the liver. The author found pronounced clinical differences between suprahepatic and infrahepatic infection on the right side; on the left side these differences were less striking. Infection occurred on the left side in 50 cases; it presented certain clinical peculiarities and was attended by a high mortality. Multiple-space infection is described and the high mortality noted, especially with bilateral abscess. Primary subphrenic abscess occurred in 17 cases; the mortality was low. Chronic subphrenic abscess is defined and 16 cases are discussed. Most cases of subphrenic abscess secondary to intraabdominal inflammation followed neighbouring infection; many of those in which the inflammation was more remote from the subphrenic region were residual abscesses following general peritonitis; no evidence was obtained to suggest spread of infection via abdominal lymphatic vessels. Subphrenic abscess in association with liver abscess occurred in 19 cases; the mortality was high. Serous pleural effusion occurred in about 25% of cases; its cause was seldom in the chest and the fluid rarely became purulent. Intrathoracic suppuration occurred in about 25% of cases, being usually due to causes such as perforation of the diaphragm or transpleural drainage of the abscess; no evidence was obtained to suggest that infection commonly spreads from the subphrenic region to the chest via lymphatic pathways. When a bronchial fistula was present in addition to intrathoracic suppuration, the mortality was significantly less. Radiological diagnosis is discussed. Gas was found in the abscess in 26·7% of patients examined radiologically, being mostly due to communication between the abscess and the bowel, the bronchial tree, or the exterior; the mortality in these cases was lower than average. Diagnostic aspiration is not advised because of its unreliability and the danger of infecting the pleura. Transserous drainage is attended by a much higher mortality than extraserous drainage and is condemned.

British Medical Association News.

MEDICO-POLITICAL.

A MEETING of the Victorian Branch of the British Medical Association was held at the Medical Society Hall, Albert Street, East Melbourne, on February 1, 1950.

Financial Statements of the Branch.

DR. H. FURNELL, a member of the finance committee of the Branch, apologized for the unavoidable absence of the Honorary Treasurer, Dr. Douglas Thomas, and presented, on his behalf, his report and the financial statements of the Branch and of the Medical Society of Victoria for the year ended December 31, 1949.

In his report Dr. Thomas stated that presenting the financial statements for the year was a pleasure tinged with more than a little sadness. He had been elected as they knew to the office of Honorary Treasurer following upon the death in August, 1949, of Dr. J. A. Cahill. Thanks to the able, careful and efficient manner in which Dr. Cahill had carried out his duties as Honorary Treasurer, the finances of the Association and of the Society were in a healthy condition when Dr. Thomas assumed responsibility for them. It would be his endeavour to see when the time came for someone else to assume the responsibility that they were in a like condition. Dr. Thomas considered that the meeting was not an inappropriate occasion to remind them that the profession was going through a trying period. But the knowledge that there were funds at hand to meet contingencies, arise when and how they might, gave a comforting assurance. It was, therefore, with a sense of satisfaction that he told them that from the point of view of finance, as disclosed by the statements that he was submitting to them, he felt and thought that they might feel that the future could be faced with confidence. It might sadden the altruist, but it was nevertheless true in their time that cash was necessary to nourish the sinews for conflict. The constitutions of the Branch of the Association and of the Society, and the multifarious activities under them, made the submission of several statements necessary. He would deal briefly with each.

Dealing first with the balance sheet of the Medical Society of Victoria, Dr. Thomas stated that it would be observed from the assets side that the building, equipment, library, balances in the State Savings Bank and the National Bank, shares, investments, furniture and fittings, freehold property *et cetera* had a book value of £30,267 6s. 4d. As an indication that the value was a conservative one, he would mention that the building in which they were meeting was put down at £1000. On the liabilities side, they would see that the building debenture issue had been reduced during the year by £1525, making it £3750; all of those debentures were held by the British Medical Insurance Company, carrying interest at a nominal rate of 1%. During the year the accumulation account had increased by £981 13s. 1d. from £4764 19s. 2d. to £5746 12s. 3d. The item Australasian Medical Publishing Company, Limited, £136, represented the amount being held by that company at December 31, on behalf of the Medical Society, in respect of debentures to be issued later by the company to the Medical Society of Victoria. Separate accounts were submitted in respect of the various *contra* items under the heading of special funds accounts, and he would explain them briefly later.

From the income and expenditure account of the Medical Society of Victoria, it would be seen that the revenue received by the Society during the year was £6343 5s. 5d., which included an apportionment from members' subscriptions of £5973 2s. 11d., grants by the British Medical Insurance Company of £275, and £95 2s. 6d. interest. The expenditure incurred, they would see, amounted to £6061 12s. 4d., which with the excess of income over expenditure transferred to the accumulation account of £281 13s. 1d. made the total of £6343 5s. 5d. In other words the Society from revenue had met its debts, redeemed £1525 worth of debentures and carried forward a credit balance of £281 13s. 1d.—not an uncreditable performance. The principal items of expenditure, they would see, were payment to THE MEDICAL JOURNAL OF AUSTRALIA for members' journals £1957 5s., salaries £1744 7s. 6d., depreciation £896 10s., repairs £233 7s. 5d., rates, taxes and insurance £427 13s. 1d.

Dr. Thomas then dealt with the next statement, the British Medical Association statement of receipts and expenditure. He stated that income received during the year had amounted to £16,945 3s. 3d.; members' subscriptions, including £2986 12s. 6d. ear-marked for the Organization Fund, amounted to £16,917 7s. 9d. Against that revenue an expenditure of £16,999 14s. 9d. was met, there were £19 in cash in hand, and there was a debit balance of £67 11s. 6d. at the National Bank. The principal items of expenditure during the year by the Branch had been payment to the British Medical Association, London, on account of journals, £2554 17s. 7d., to the Federal Council on account of capitation fee, £2143 1s., to the Medical Society of Victoria for subscription apportionment, £5973 2s. 11d., to the Medical Society of Victoria Organization Fund, also for subscription apportionment, £2986 12s. 6d., and for salaries, £2292 7s. The other items represented recurring trading expenses with respect to stationery, printing, lighting, heating *et cetera*.

With regard to the special funds and accounts which he had mentioned earlier, Dr. Thomas stated that he would first deal with the Medical Society of Victoria Organization Fund, a very important acquisition at the present time. The receipts side, they would notice, totalled £8400 8s., which included a credit balance at the National Bank, a credit balance on securities at the State Savings Bank on December 31, 1948, and subscriptions, donations and interest received during the year under review. Against that revenue on the other side of the account they would see the expenditure met. With the exception of a donation of £150 to the Repatriation Medical Officers' Association to assist in the presentation of a claim for increased pay and conditions, all that expenditure was to enable the profession to present its case against the Commonwealth Government's National Health proposals. The items, which included a donation to the Federal Council Independence Fund of £1000, were separately enumerated and needed no explanation, except perhaps the debit balance of £1526 18s. 3d. with the National Bank. And in regard to that debit, it was merely necessary for Dr. Thomas to say that it would be liquidated when certain adjustments had been made with the Federal Independence Fund.

BRITISH MEDICAL ASSOCIATION—VICTORIAN BRANCH.

Statement of Receipts and Expenditure for Year Ended December 31, 1949.

Receipts	£	s.	d.
Balance at December 31, 1948—Cash in Hand	19	0	0
Lists of Members	8	15	6
Subscriptions	13,939	15	3
Subscriptions—Organization Fund	2,986	12	6
Balance at December 31, 1949—National Bank of Australasia, Limited	67	11	6
	£17,012	14	9

Expenditure	£	s.	d.
Advertising	1	3	6
Bank Charges and Exchange	1	3	4
British Medical Association, London	2,554	17	7
Federal Council of the British Medical Association in Australia—Capitation Fees	2,143	1	0
Medical Society of Victoria	5,973	2	11
Medical Society of Victoria—Organization Fund	2,986	12	6
Postages	387	7	4
Printing	46	9	9
Rebates to Subdivisions	51	8	6
Stationery	353	15	2
Sundry Expenses	155	0	0
Salaries	2,292	7	0
Lighting	1	19	1
Travelling Expenses	2	14	3
Entertainment	14	14	11
Pay Roll Tax	27	17	11
Balance at December 31, 1949—Cash in Hand	19	0	0
	£17,012	14	9

The British Medical Association Legacy Fund, a fund to provide assistance to widows and orphans of World War II, was in a healthy condition, and after the making of grants and provision of hospital insurance to legatees, had securities in hand to the value of £2800 and a credit balance at the National Bank of £26 12s. 2d. The Fund, they would observe, had benefited from certain subventions from the British Medical Association Insurance Fund. The Food for British Doctors Fund, after the sending of food parcels abroad to the value of £137 10s., was in credit £19 3s. 5d. The Medical Society of Victoria Debenture Redemption Fund, after the redeeming of the debentures aforementioned, had a credit with the State Savings Bank of £170 7s. 4d. The property account, the separate account under which the receipts and expenditure of the property at 384-386 Albert Street were recorded, had a credit balance at the State Savings Bank of £938 0s. 2d. The building account, in respect of Webster House, 85 Spring Street, after meeting all expenses, had finished the year with a credit balance at the National Bank of £106 13s. The Crawford Mollison Fund had a credit at the National Bank of £339 2s. 9d. It was hoped that in the near future that fund would be applied to the purpose for which it was subscribed. The Embley Memorial Fund had a credit at the State Savings Bank of £245 14s. 3d. and £600 in Commonwealth Government loans. The Stawell Memorial Fund had a credit at the State Savings Bank of £310 13s. 10d. and £600 in Commonwealth Government loans. The Syme Fund had a credit at the State Savings Bank of £95 16s. and £220 in Commonwealth Government loans. The R. H. Fetherston Fund had a credit in the State Savings Bank of £101 14s. 7d. and £505 in Australasian Medical Publishing Company, Limited,

MEDICAL SOCIETY OF VICTORIA.

Balance Sheet at December 31, 1949.

	£ s. d.	£ s. d.
Debenture Issue	5,275 0 0	
Less Debentures Redeemed	1,525 0 0	
150 Debentures of £25 each carrying interest at 1%		3,750 0 0
Accumulation Account	4,764 19 2	
Add Debentures, Australasian Medical Publishing Company, Limited	700 0 0	
Excess of Income over Expenditure	281 13 1	
		5,746 12 3
Australasian Medical Publishing Company, Limited, as *per contra*		136 0 0
Special Funds and Accounts as *per contra*—		
Debenture Redemption Account	170 7 4	
Property Account	4,718 0 2	
Building Acount — Webster House	380 15 1	
Organization Fund	4,199 13 1	
Legacy Fund	2,826 12 2	
Food for British Doctors Fund	19 3 5	
Crawford Mollison Fund	339 2 9	
Embley Memorial Fund	845 14 3	
Stawell Memorial Fund	910 13 10	
Syme Fund	315 16 0	
R. H. Fetherston Fund	606 14 7	
Annual Meeting (1935) Prize Fund	1,489 17 11	
Contract Practitioners Account	136 1 4	
Independence Fund	3,673 19 8	
Federal Medical War Relief Fund	2 2 6	
		20,634 14 1
		£30,267 6 4

	£ s. d.	£ s. d.
Building on Crown Grant at 426 Albert Street — Arbitrary Valuation		1,000 0 0
Equipment, Furniture and Fittings, some at Valuation and others at Cost, less Depreciation		1,133 1 6
Library, some at Valuation and others at Cost, less Depreciation		1,541 5 9
National Bank of Australasia, Limited		1,398 15 9
State Savings Bank of Victoria		520 16 11
Commonwealth Government Loans at Cost		500 0 0
Investments—		
5000 Shares of £1 each, British Medical Agency, Proprietary, Limited, at Arbitrary Valuation		1,000 0 0
23 Debentures 3½% of £100 each, Australasian Medical Publishing Company, Limited, at Cost		2,300 0 0
Sundry Debtors—		
Medical Practice Finance Company, Limited		102 12 4
Australasian Medical Publishing Company, Limited, as *per contra*		136 0 0
Special Funds and Accounts as *per contra*—		
National Bank of Australasia, Limited	2,640 15 3	
State Savings Bank of Victoria	3,114 16 9	
Commonwealth Government Loans	10,320 0 0	
Debentures	505 0 0	
Imprest Cash	5 0 0	
Furniture and Fittings at Cost, less Amount Written off	269 2 1	
Freehold Property 384-386 *Albert Street, at Cost*	3,780 0 0	
		20,634 14 1
		£30,267 6 4

MEDICAL SOCIETY OF VICTORIA.

Income and Expenditure Account for the Year Ended December 31, 1949.

	£ s. d.	£ s. d.
Subscription Allocation	5,973 2 11	
British Medical Insurance Company—Grants	275 0 0	
Interest	95 2 6	
	£6,343 5 5	
Printing		5 10 7
THE MEDICAL JOURNAL OF AUSTRALIA		1,957 5 0
Medical Secretary—Salary		1,528 17 6
Life Assurance Premium		162 17 6
Caretaker Salary		215 10 0
Audit Fees		52 10 0
Debenture Interest		75 12 6
Electricity and Cleaning		57 11 6
Entertainment		110 17 9
Legal Expenses		29 18 6
Depreciation		896 10 10
Repairs		233 7 5
Rates, Taxes and Insurance		427 13 1
Postage and Sundry Expenses		63 8 0
Telephone		94 2 2
Debenture Redemption Account		150 0 0
Excess of Income over Expenditure transferred to Accumulation Account		281 13 1
		£6,343 5 5

debentures. The Income Insurance Fund, which had funds and securities to the value of £2932 13s. 8d., had been closed by the disbursing to beneficiaries of £134 4s. 9d., by transfer to the Legacy Fund of £1833 2s. 6d., by the refunding to contributors of a sum of £964 16s. 5d. and by the meeting of bank charges of 10s. The Annual Meeting (1935) Prize Fund had a credit at the State Savings Bank of £489 17s. 11d. and £1000 in Commonwealth Government loans. The contract practitioners account had a credit at the State Savings Bank of £36 1s. 4d. and £100 in Commonwealth Government loans.

The Federal Independence Fund had received by contributions from Branch members a sum of £12,994 17s. 9d. and a contribution of £1000 from the Medical Society of Victoria Organization Fund, a total of £13,994, 17s. 9d. Of that amount £10,000 had been remitted to the trustees in Sydney, £320 18s. 1d. has been expended on postages, printing and exchange, and there was a credit balance in the National Bank of £3673 19s. 8d. The Federal Medical War Relief Fund had a credit balance of £2 2s. 6d., which would be remitted to the trustees in Sydney in due course.

In conclusion Dr. Thomas drew attention to the generous assistance given by the British Medical Insurance Company. He commended to members the advantages offered by the profession's own company when they were insuring against fire, accident and burglary risks, and pointed out that the profession benefited by profits made by the company. He stated that it also gave him pleasure to place on record that members had contributed during the year an amount of no less than £428 16s. to the Victorian Medical Benevolent Association.

The report was adopted.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on November 24, 1949, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, DR. J. KEMPSON MADDOX, the President, in the chair.

Chemotherapy in Malignant Disease and Blood Dyscrasias.

DR. A. W. MORROW read a paper entitled "Chemotherapy of Neoplastic Diseases and Blood Dyscrasias" (see page 322).

DR. H. J. HAM, in opening the discussion, expressed his thanks to Dr. Morrow for his very excellent presentation of the subject. With reference to the use of urethane in leuchæmia, Dr. Ham said that he had discussed this with Dr. Paterson, who had done the relevant work, and although the effects of urethane would appear to be similar to those of X-ray treatment, he felt that generally the results from X rays applied carefully were better. He agreed with Dr. Morrow that nitrogen mustard, in the form of the compound at present available in Australia and generally known as HN_2, found its most useful therapeutic role in the treatment of Hodgkin's disease. It had been generally advised for those patients who had become resistant to X-ray treatment. Dr. Ham felt that some of these patients were not really radio-resistant; but that perhaps the X rays had been applied in insufficient dosage or not widely enough to cover all the areas of active disease. This might explain those cases in which after the application of HN_2 the patients again showed sensitivity to X rays. Dr. Ham also pointed out that HN_2 had been found to produce symptomatic improvement and occasional objective improvement in cases of inoperable carcinoma of the lung. In Melbourne he had been informed that in a series of these cases treatment had been carried out with this substance; the procedure was to give a first course of HN_2 and then a small dose once a month, and then after a period of three months to follow it with a short course of deep X-ray therapy.

Dr. Ham said that it might be held that radioisotopes should not be discussed in a lecture dealing with chemotherapy. He himself thought that they should be considered really as a part of radiotherapy; but it was right that they should come into a discussion such as the present one. The use of radioactive isotopes in medical research and treatment offered great promise for the future. At the moment they were of more importance in research and there was hardly a field in modern scientific investigation where they were not being used. Numerous investigations in physiology and biochemistry, and in the anatomical distribution of various elements, had been and were being carried out with them. They were also of value in some diagnostic tests in clinical medicine.

The treatment of *polycythæmia vera* by radioactive phosphorus or P^{32} was, of course, well known and had been used in Australia; it was accepted by many as the best method of treatment for the disease. Dr. Ham said that a new departure which he had seen in California during the previous year was the development of radioactive colloids which were selectively localized to the liver, spleen and bone marrow. He had seen colloidal radio-yttrium being used in the treatment of chronic leuchæmia. Other colloids were colloidal chromic radio-phosphate and colloidal zirconium oxide. The localization of these in special organs was by virtue of the size of the particles and was related in some way to their charge. One of the hopes for the future was the possibility, as Dr. Morrow had mentioned, of finding a substance with selective absorption in malignant cells. However, as the metabolism of tumour cells did not appear to be very much different from that of normal cells, it was by no means certain or even hopeful that a radioisotope of that type would be obtained.

One piece of experimental work done in California appeared to Dr. Ham of particular interest. That was the administration of radiotyrosine (the carbon atom being radioactive) to animals with implanted melanosarcoma; the uptake of the radioactive substance was found to be particularly high in the tumour tissue. The concentration, however, was not high enough to suggest the use of the substance in therapy of that type of tumour. The work was being continued.

DR. JAMES ISBISTER said that Dr. Morrow had mentioned androgen therapy as having been unsuccessful in mammary carcinoma; he (Dr. Isbister) had had experience of only one case, but in that androgen therapy had been, symptomatically at least, very successful. The patient had had a small primary growth, present for eighteen months, and widespread secondary deposits in bone; as far as could be determined, there were no metastases in other parts of the body. She was considered to be unsuitable for radiation therapy, and was suffering from widespread pain in bone. She was given some form of testosterone, with great relief of the pain. That encouraged her medical attendants to implant testosterone subcutaneously. She was followed up for nine months, and her condition remained satisfactory. What happened to her later was not known. The treatment would not produce a cure, but so far the result was good. Referring to the use of nitrogen mustard in leuchæmia, Dr. Isbister said that at the Manchester Infirmary Wilkinson and Israels were using nitrogen mustard extensively in chronic myeloid leuchæmia when irradiation had been used for some time and had ceased to have a beneficial effect. Nitrogen mustard would often produce remissions for six months or more. Large numbers of such patients were treated at the Manchester Infirmary, and the results were encouraging. Dr. Isbister went on to say that credit should be given where credit was due. Dr. Morrow had said that Gilman in America had been largely responsible for the introduction of the nitrogen mustards; the original work had been started in Manchester. Israels had noted the occurrence of leucopenia in persons working in war gas factories and was encouraged to make use of the observation. Though the information was confidential during the war, it was passed over to the Americans, who set to work on it and published the first figures.

DR. E. F. THOMSON asked whether Dr. Morrow could give some information on the mode of action of nitrogen mustard in the treatment of Hodgkin's disease. He said that those who had something to do with the administration of pooled human serum were perturbed by the fact that some patients who received it developed homologous serum jaundice. Work had been done in America to make pooled human serum safe from that point of view; ultra-violet irradiation had been tried and had been found useful in destroying the icterogenic agent. Later nitrogen mustard had also been found to be effective in destroying the icterogenic agent. Dr. Thomson asked Dr. Morrow whether there was a suggestion in those two observations, in view of the fact that the icterogenic agent was presumed to be a virus.

DR. MAURICE JOSEPH said that Dr. Morrow in his very instructive paper had had time only to touch on the use of P^{32} in *polycythæmia vera*. Not many practitioners had had opportunities to use it in more than a few cases. He (Dr. Joseph) had used it in two typical cases; the full recommended dosage was given (4·2 millicuries), and the therapy had been entirely without effect. One patient was a youth, aged nineteen years, who had the condition in its familial form; his brother had had to undergo amputation of a leg for the same disease. The patient had a red cell count of 10,000,000 per cubic millimetre and a hæmoglobin value of 28 grammes *per centum*. It was thought that some effect would follow the administration of P^{32}, but no fall

in the blood count occurred. It was disappointing, in view of the encouraging reports published in the literature, Dr. Joseph wondered whether some explanation might be forthcoming from Dr. Morrow or Dr. Ham.

Dr. Maddox said that the subject under discussion was fascinating; so much about it had appeared in the literature that the time for stock-taking had arrived. Even in THE MEDICAL JOURNAL OF AUSTRALIA somewhat contradictory reports had appeared. It was interesting and valuable to have Dr. Morrow's opinion about the present situation. Substances which were new were often thought to be superior for that reason. Dr. Maddox thought that after the burst of enthusiasm for those substances, which was right and proper, there would be a reaction, and they would never hear again of aminopterin; they would hear again of urethane only in the treatment of multiple myeloma, and they would hear of nitrogen mustard only in the treatment of advanced Hodgkin's disease. Unfortunately there still seemed to be no substance which could distinguish between the qualitative composition of a cancer cell and a normal blood-cell precursor. The substances under discussion were all myelotoxic and in some cases highly dangerous. Dr. Maddox said that he had seen William Dameshek demonstrate a young girl who, he said, had actually become radio-resistant. She had had Hodgkin's disease for five years and had been treated with X rays in large amounts, and ultimately even when the dose was pushed to the maximum tolerated, the glands were unaffected. Nitrogen mustard produced a dramatic effect for a short time, and some weeks later, when the glands showed signs of increasing in size, X rays were given in average or commencing dosage and were effective. Dr. Maddox said that he believed, with Dr. Morrow, that the use of combined X-ray and nitrogen mustard therapy in a maintenance scheme would be the answer to advanced Hodgkin's disease. Urethane could cause some rather startling maleffects on the bone marrow. In two cases in which that had happened, the sudden appearance of profound leuchæmia had been preceded by nausea for some days. Nausea might be a warning symptom requiring attention. Referring to *polycythæmia vera*, Dr. Maddox said that he had seen one of the two patients mentioned by Dr. Joseph in an earlier period, and could confirm his statements about the disappointing results of treatment with P^{32}, and could record the good effects of repeated venesection. Dr. Maddox said that treatment with X-ray sprays or baths did not seem to be common in Australia; he thought that there was often a need for some such means of disseminating irradiation or a cytotoxic substance throughout all parts of the body, and not simply confining it to those which were the seats of obvious disease. For that reason, he thought that nitrogen mustard and other cytotoxic substances for parenteral administration might have a particular place as opposed to localized application of X rays. Dr. Maddox went on to say that in mammary cancer androgens were effective in the treatment of bone metastases; the X-ray improvement and the clinical relief of pain were gratifying. He doubted whether the ultimate course of the cancer was affected, and the masculinizing effect was sometimes terrifying. However, there was a place for androgens in the treatment of women who for some reason could not reach a radiotherapist.

Dr. Morrow, in reply to Dr. Thomson, said that he could not explain how the nitrogen mustards acted. It was interesting that all investigators stressed the fact that they had been most effective experimentally in mouse sarcoma, which was of virus origin. The response of Hodgkin's disease might prove that it was not a true malignant disease. Dr. Morrow said that he should have mentioned the fact that androgens did produce relief of pain in bony metastases from breast carcinomata, but that they had no effect on carcinomata metastasizing in the soft tissues. He could not say why that was so. In all the cases in which improvement had been recorded following the use of androgens, the effect had been on bony metastases. Dr. Morrow said that he regretted having deprived Israels of the credit for introducing nitrogen mustard; he had followed the literature. However, it did seem that the Americans had been given the problem of developing the nitrogen mustards, and that was probably why Gillman received most of the credit. But he reported, and stressed in his report, that the work had been recorded earlier, and he even quoted British reports.

Dr. Ham, in reply to Dr. Joseph, said that he could not help feeling that in the case to which he had referred, the dosage had not been sufficiently high. He himself could not speak with any wide experience of P^{32}. In America it was emphasized that one must wait for eight weeks or perhaps more, and if no response had occurred one must give another three or four millicuries. They went up to nine or ten millicuries in some cases. Other patients responded to one injection only.

Referring to X-ray baths, Dr. Ham said that they had been using them in Sydney for some little time. He believed that they did produce results in polycythæmia; their use was a matter which should be investigated. In a few cases he had been able to produce remissions for some time. He could not say whether the method was better or worse than the use of P^{32}. It was no good applying X rays to one little area of the body and expecting a general effect; it was better to expose wide areas to irradiation.

Dr. Maddox, from the chair, thanked Dr. Morrow and Dr. Ham for their interesting and valuable contributions. He thought that the relatively short discussion was due to the fact that individually those present did not treat large numbers of these patients under the present system of organization and clinical research. It was just chance if anyone came in contact with a few more than anybody else, and it should not lead such a person to draw dogmatic conclusions. Those present were indebted to Dr. Morrow for putting the present position as he saw it, and as it appeared to those who had large series of cases to study.

Correspondence.

POLIOMYELITIS AND TONSIL AND ADENOID OPERATIONS.

SIR: Dr. D. G. Carruthers (THE MEDICAL JOURNAL OF AUSTRALIA, February 25, 1950) has questioned the recent ruling by the New South Wales Consultative Council for the Physically Handicapped that operations for removal of tonsils and adenoids should be avoided, if possible, during the present poliomyelitis epidemic. (THE MEDICAL JOURNAL OF AUSTRALIA, January 28, 1950.)

Dr. Carruthers has asked for information about this problem based on figures for Australia or New South Wales; unfortunately such figures are not available to me. Dr. F. N. Street of this city is carrying out a study of the possible part played by trauma and other "noxious influences" in the precipitation and localization of the paralysis of poliomyelitis and hopes to include in his final report figures of the type suggested by Dr. Carruthers.

I hope that the following limited review of some of the American literature on this subject may help to convince Dr. Carruthers of the hazards associated with the removal of tonsils and adenoids during an epidemic of poliomyelitis.

Forty years ago Sheppard of the Massachusetts Board of Health published the first report to emphasize the risks associated with the removal of tonsils and adenoids during an epidemic of poliomyelitis. Apparently this report received very little attention until 1928 and 1929, when Ayer reported nine cases of bulbar poliomyelitis which had followed tonsillectomy and Aycock and Luther reported that of 16 cases of paralytic poliomyelitis which followed operations on the nose and throat, 12 were of the bulbar type.

During the period 1938-1941 various reports of bulbar and paralytic poliomyelitis following operations for the removal of tonsils and adenoids appeared in the American literature and these included 29 cases reported by Eley and Flake, 12 cases reported by Stillerman and Fischer and 27 cases reported by Fischer, Stillerman and Marks. In all these reports the poliomyelitis was usually, but not exclusively, bulbar in type.

In September, 1941, Krill and Toomey published their dramatic report of five children from one family who all developed bulbar poliomyelitis within twelve days of the removal of their tonsils and adenoids. These operations were performed on the morning of August 22, by September 7 all of these five children had developed bulbar poliomyelitis and by September 9 three of these children had died. The parents and the remaining child of two and a half years of age who was not submitted to operation did not present any obvious disturbance of health.

In 1942 Aycock collected from the literature and from his own experience 170 cases in which an operation for removal of tonsils and adenoids was followed within thirty days by paralytic poliomyelitis and showed that the paralysis was of a bulbar type in 121 or 71% of these cases.

In 1948 the most recent report of The American Laryngological, Rhinological and Otological Society *questionnaire* survey of this problem was published by Daniel Cunning who stated:

> I am more than ever convinced that there is no causal relationship between the two, and that when a

bulbar poliomyelitis follows a tonsillectomy it is coincidental.

Harold Faber, of the Children's Hospital, Boston, and the Harvard University, has reviewed this Cunning report in an editorial on "Adenotonsillectomy and Poliomyelitis" which appeared in *Pediatrics* (the journal of the American Academy of Pediatrics) and has commented as follows:

> We now come to a consideration of the Cunning report. Data were obtained on 4331 cases of Poliomyelitis occurring during 1947 in 25 States, in only three of which an epidemic of Poliomyelitis appeared during that year. Adenotonsillectomies and other operations occurring within two months before the onset of symptoms were recorded. Unfortunately, these were not analyzed by month or season, but may perhaps be assumed to have occurred mainly during the usual summer and autumn period. In this series, 24 had been subjected to tonsillectomy within two months of onset, of which six, or 25%, were bulbar. The incidence of the bulbar form in the entire group of 4331 cases was 509, or 11·7%. The corresponding figures for the 1946[1] survey, comprising 2476 cases of Poliomyelitis, show 62 post-tonsillectomy cases of which 18, or 29%, were bulbar, as compared with a total incidence of 382 bulbar cases, or 15·4% for the entire group. Thus the proportion of bulbar cases to all types of Poliomyelitis was somewhat more than twice as great in the tonsillectomized as in the non-tonsillectomized patients—a point which is not brought out by the author. The fact that this is somewhat lower than in the Aycock summary already cited may be due to the use of a 60 day instead of a 30 day post-operative period, the latter representing more nearly the correct period of incubation. Other data from the Aycock report show that in the 30-60 day group, only 20% were bulbar.
>
> In order to obtain a fair picture of the effects of tonsillectomy on Poliomyelitis, it would be preferable to have representative data on the incidence of Poliomyelitis after a large series of tonsillectomies, preferably divided into two groups, one during the non-epidemic season and the other during the epidemic season of Poliomyelitis, so that the incidence after operation could be compared with the incidence in the entire population. A rather unsatisfactory attempt, apparently by a separate questionnaire (since only 15 States were covered, and these not exactly the same as in the other portion of the study) was made to obtain figures of this general sort for 1947.
>
> Records of 5439 tonsillectomies were secured, nearly half of them from New York where Poliomyelitis was not epidemic and only 54 of them from Ohio, the only State of the 15 in which it was epidemic. Two cases of Poliomyelitis occurred in this group, a figure which appears small at first glance, but when reduced to standard terms is equal to 36·8 cases per 100,000 tonsillectomies and is nearly five times the incidence of 7·4 per 100,000 for the United States during that year.

In 1945, John Anderson published an excellent statistical study of an epidemic of poliomyelitis which began in the State of Utah in August, 1943, and reached its peak in September of that year. Anderson concluded that during this epidemic the incidence of poliomyelitis amongst children whose tonsils and adenoids had been recently removed was 2·6 times greater than the incidence of poliomyelitis in the general child population and that the incidence of bulbar poliomyelitis was 16 times greater than in the general child population.

Harold Faber concludes his editorial on "Adenotonsillectomy and Poliomyelitis" with the following significant statements:

> Proofs of the existence of the causal relationship and of the hazards from adenotonsillectomy at times and places of epidemics are positive and have not been refuted by the Cunning survey. Indeed, the latter may fairly be used in support of the effectiveness of withholding the operation under such circumstances as a preventive measure. It is to be earnestly hoped that pediatricians will continue to advise parents of the inadvisability and serious dangers of adenotonsillectomy when Poliomyelitis is present in the community.

Yours, etc.,

LORIMER DODS,
Professor of Child Health.

The University of Sydney,
March 2, 1950.

[1] For the United States as a whole, 1946 had the highest incidence of poliomyelitis (19·5 per 100,000) since 1916; while 1947 had the lowest (7·4 per 100,000) since 1942.

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Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR APRIL.

Courses for Part I of Higher Degrees and Diplomas.

UNIVERSITY classes for candidates for Part I of the M.D., M.S. and the diplomas, and pathology classes for candidates for Part II of the diplomas, which commenced in March, will be continued till August. On Mondays and Wednesdays, pathology classes are at 2 p.m., pathology practical classes at 2.45 p.m., anatomy classes at 2 p.m. and physiology classes at 3.45 p.m.

Course in Thoracic Diseases.

A course in thoracic diseases, suitable for candidates for M.D. Part II and M.R.A.C.P., but open to all practitioners, has been arranged by Dr. C. H. Fitts. The programme is as follows:

April 4, Dr. Howard Williams, at the Children's Hospital, (*a*) "Bronchiectasis"; (*b*) "Pulmonary Aspects of Fibrocystic Disease".

April 6, Dr. Eric Clarke and Dr. T. H. Steel, at the Alfred Hospital, "Pulmonary Suppuration".

April 11, Dr. D. B. Rosenthal, at Gresswell Sanatorium, "Aspects of Pulmonary Tuberculosis".

April 13, the Austin Hospital Staff, "Aspects of Pulmonary Tuberculosis".

April 18, lecture to be arranged on industrial diseases of the lung.

April 20, Dr. C. H. Fitts, at the Royal Melbourne Hospital, "Functional Disorders of Respiration". Appropriate patients will be shown at each demonstration. Classes commence at 2 p.m. The fee for this course is £3 3s., or 10s. 6d. per demonstration.

Course in Pædiatrics.

A course in pædiatrics, suitable for candidates for M.D. Part II and M.R.A.C.P., consisting of six demonstrations arranged by Dr. Mostyn L. Powell, will be held on Tuesday and Thursday afternoons, commencing on Thursday, April 27. Details will be published with the May programme.

Enrolments.

Enrolments for courses in metropolitan centres should be made with the Secretary of the Post-Graduate Committee, 426 Albert Street, East Melbourne. Telephone: JM 1547.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

GENERAL REVISION COURSE, 1950.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that the annual general revision course will be held in Sydney for two weeks beginning March 27, 1950, under the supervision of Dr. R. L. Harris. Fees for attendance will be as follows: full course, £5 5s.; mornings or afternoons only, £3 3s.; one week only, £3 3s. Early application, with remittance enclosed, should be made to the Course Secretary, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney. Telephones: BU5238, BW 7483. Telegraphic address: "Postgrad Sydney". Candidates may submit in writing questions for the panel discussion. These must be received at the office not later than Tuesday, March 21, 1950.

Programme.

Monday, March 27, at the Stawell Hall, 145 Macquarie Street, Sydney: 9.15 a.m., registration and opening of course, Colonel A. M. McIntosh; 10.30 a.m., seminar—"Pulmonary Tuberculosis", Dr. Cotter Harvey, Dr. M. P. Susman, Dr. Bruce White, Dr. R. M. de Lambert and Dr. C. G. Bayliss; 2.15 p.m., "Pitfalls of Diagnosis and Treatment in Common Skin Diseases", Dr. F. C. Florance; 3.30 p.m., panel discussion—"Hypertension", Dr. S. A. Smith, Dr. K. B. Noad, Dr. Lister Reid and Dr. W. A. Bye.

Tuesday, March 28, at the Stawell Hall: 9.15 a.m., "Hernia", Dr. N. Wyndham; 10.30 a.m., "Tumours of Breast", Dr. W. Maxwell; 11.30 a.m., "Hæmaturia", Dr. J. W. S. Laidley; 2.15 p.m., "Ear, Nose and Throat in General Practice", Dr. D. G. Carruthers; 3.30 p.m., seminar—"Acute Abdomen", Dr. B. T. Edye, Dr. V. M. Coppleson, Dr. R. J. Malcolm, Dr. Frank H. Mills and Dr. K. W. Starr.

Wednesday, March 29, at the Stawell Hall: 9.15 a.m., "Chronic Arthritis", Dr. Selwyn G. Nelson; 10.30 a.m., "Endocrine Problems in General Practice", Dr. E. H. Stokes; 11.30 a.m., "Alcoholism", Dr. S. J. Minogue; 2.15 p.m., "Ocular Emergencies in General Practice", Dr. N. McAlister Gregg; 3.30 p.m., "Physiological Aspects of the Training of Athletes", Professor F. S. Cotton.

Thursday, March 30, at the Stawell Hall: 9.15 a.m., seminar—"Gynæcology in General Practice", Dr. F. A. Maguire, Dr. H. H. Schlink, Dr. R. I. Furber, Dr. Donovan Foy, Dr. F. N. Chenhall, Dr. A. R. H. Duggan, Dr. Angus Murray, Dr. R. H. Macdonald; 2.15 p.m., symposium—"Prolonged Labour", Professor F. J. Browne (University College Hospital, London, by courtesy of the King George V, Queen Mary Maternal and Infant Welfare Foundation) and Professor Bruce T. Mayes.

Friday, March 31, at the Lecture Theatre, Royal Alexandra Hospital for Children, Camperdown: 9.30 a.m., "Perthes's Disease and Allied Conditions", Dr. C. J. D. Langton; 10.15 a.m., "Surgery of Newly-born", Dr. T. Y. Nelson; 11.00 a.m., symposium—"Poliomyelitis", Professor Lorimer Dods, Dr. Stephen Williams and Dr. Laurence Macdonald. At Royal Prince Alfred Hospital, Camperdown: 2.15 p.m., "Recent Advances in Clinical Pathology", the staff of the Fairfax Institute of Pathology.

Saturday, April 1, at Broughton Hall Psychiatric Clinic, Wharf Road, Leichhardt: 10.00 a.m., lecturette and demonstration on mental illnesses associated with the child-bearing period, Dr. Guy Lawrance and staff.

Monday, April 3, at the Stawell Hall: 9.15 a.m., "Ambulant Fractures", Dr. A. R. Hamilton; 10.30 a.m., "Management of Closed Head Injuries", Dr. I. Douglas Miller; 11.30 a.m., "Bleeding *per Rectum*", Dr. V. J. Kinsella. At King George V Memorial Hospital for Mothers and Babies, Camperdown: 2.30 p.m., question session on obstetric problems—Professor F. J. Browne will be present.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED FEBRUARY 18, 1950.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	*	1	..	..	3	..	..	..	4
Anthrax	*	..	..	..	..	..	..	..	..
Beriberi	*	*	*	*	..	*	..	*	..
Bilharziasis	*	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	1	..	..	..	..	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	*	*	*	*	*	*	*	*	..
Dengue	*	*	*	*	*	*	..	*	..
Diarrhœa (Infantile)	..	..	2(2)	..	..	..	..	..	2
Diphtheria	5(5)	3(2)	7(1)	..	3(2)	..	..	..	18
Dysentery (Amœbic)	*	..	..	..	1	..	..	..	1
Dysentery (Bacillary)	*	..	14(14)	..	..	..	..	..	14
Encephalitis Lethargica	..	..	..	..	..	..	..	..	..
Erysipelas	*	*	*	1(1)	*	*	..	..	1
Filariasis	*	..	..	..	..	..	..	..	..
Helminthiasis	*	..	*	*	*	*	*	*	..
Hydatid	*	*	*	..	*	*	..	..	..
Influenza	*	*	*	..	*	*	*	*	..
Lead Poisoning	*	*	..	*	*	*	*	*	..
Leprosy	..	..	..	..	..	2	..	..	2
Malaria(*b*)	*	..	..	..	..	..	..	..	..
Measles	*	*	*	3(3)	*	*	..	..	3
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	13(6)	5(1)	*	36(31)	*	*	*	*	54
Psittacosis	*	..	*	..	..	..	..	..	..
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella(*c*)	*	*	*	*	1(1)	*	..	..	1
Scarlet Fever	9(6)	12(7)	6(1)	8(2)	7(6)	..	..	1	43
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	*	1	..	*	*	*	*	*	1
Trachoma	*	..	*	*	*	*	*	*	..
Tuberculosis(*d*)	25(17)	14(9)	39(20)	3(3)	16(12)	2(2)	..	..	99
Typhoid Fever(*e*)	1	1(1)	..	..	1(1)	1(1)	..	1	5
Typhus (Endemic)(*f*)	1	..	1	..	1(1)	..	..	..	2
Undulant Fever	..	1	..	..	..	..	..	..	1
Weil's Disease(*g*)	*	*	*	*	*	*	*	*	..
Whooping Cough	*	*	*	12(2)	*	*	..	..	12
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 37, 1946–1947. Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from the Northern Territory.
* Not notifiable.
(*a*) Includes Mossman and Sarina fevers. (*b*) Mainly relapses among servicemen infected overseas. (*c*) Notifiable disease in Queensland in females aged over fourteen years. (*d*) Includes all forms. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Includes scrub, murine and tick typhus. (*g*) Includes leptospiroses, Weil's and para-Weil's disease.

Tuesday April 4, at the Stawell Hall: 9.15 a.m., "Pneumonias", Dr. A. J. Collins. At the Maitland Lecture Theatre, Sydney Hospital: 10.30 a.m., demonstration on blood transfusion by Dr. R. J. Walsh, with commentary by Dr. R. L. Harris.

Wednesday, April 5, at the Stawell Hall: 9.15 a.m., "Nephritis", Dr. C. G. McDonald; 10.30 a.m., "New Drugs", Dr. A. W. Morrow; 11.30 a.m., "Myocardial Infarction", Dr. T. E. Hester Spark; 2.15 p.m., lecture on some common dermatological conditions and their demonstration by coloured photo projector, Dr. J. C. Belisario; 3.30 p.m., question time, Dr. Kathleen Winning, Dr. Gordon Lowe, Dr. Lyle Buchanan, Dr. Richmond Jeremy.

Thursday, April 6, at the Stawell Hall: 9.15 a.m., "Recent Advances in Pharmacology", Professor R. H. Thorp; 10.30 a.m., "Infectious Diseases in General Practice", Dr. N. J. Symington; 11.30 a.m., "Venereal Disease", Dr. Norman N. Gibson; 2.15 p.m., "Diabetes", Dr. J. Kempson Maddox; 3.30 p.m., film session.

Obituary.

GERALD CARL WEIGALL.

WE regret to announce the death of Dr. Gerald Carl Weigall, which occurred on February 22, 1950, at South Yarra, Victoria.

RAYMOND ASHER MILTON ALLEN.

WE regret to announce the death of Dr. Raymond Asher Milton Allen, which occurred on February 5, 1950, at Concord, New South Wales.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association.

Mallett, Keith Charles, M.B., B.S., 1947 (Univ. Sydney), 240 Old South Head Road, Bondi.

Pettitt, Gordon Charles, M.B., B.S., 1948 (Univ. Sydney), Prince Henry Hospital, Little Bay.

Plowman, Roderick Leopold, M.B., B.S., 1948 (Univ. Sydney), 76 Summer Street, Orange.

Powrie, Neville John Desmond, provisional registration, 1949 (Univ. Sydney), Maitland Hospital, Maitland.

Reimer, John Edward, provisional registration, 1949 (Univ. Sydney), "Rosemont", 25 Shirley Road, Roseville.

Rogers, Norman James, M.B., B.S., 1947 (Univ. Sydney), 24 Conway Street, Lismore.

Ross, Judith May, provisional registration, 1949 (Univ. Sydney), Sydney Hospital, Sydney.

Thompson, Janet Fraser, provisional registration, 1949 (Univ. Sydney), Cessnock District Hospital, Cessnock.

Walker, Thomas Bridson, provisional registration, 1949 (Univ. Sydney), 26 Burlington Road, Homebush.

Way, Stephanie Susie Jay, provisional registration, 1949 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Wolfers, David, provisional registration, 1949 (Univ. Sydney), Albury District Hospital, Albury.

Woods, William Cleaver, provisional registration, 1949 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Maitland, Herbert Lethington Chisholm, M.B., Ch.M., 1923 (Univ. Sydney), F.R.C.S., 1947 (England), 193 George Street, Bathurst.

Woodhouse, Edward Beaumont, M.R.C.S. (England), L.R.C.P. (London), 1935, 43 Gerrish Street, Gladesville.

Cummins, Cyril Joseph, M.B., 1938 (Univ. Sydney), 8 Bona Vista Avenue, Maroubra Bay.

Parkin, Gordon Maurice, provisional registration, 1949 (Univ. Sydney), 339 Queen Street, Concord West.

McBride, William Griffith, provisional registration, 1949 (Univ. Sydney), St. George Hospital, Kogarah.

Line, Daphne Harrington, provisional registration, 1949 (Univ. Sydney), Rachel Forster Hospital, Redfern.

Harris, Henry, provisional registration, 1949 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Diary for the Month.

MAR. 13.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
MAR. 14.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MAR. 14.—New South Wales Branch, B.M.A.: Ethics Committee.
MAR. 15.—Western Australian Branch, B.M.A.: Branch Meeting.
MAR. 16.—Victorian Branch, B.M.A.: Executive Meeting.
MAR. 22.—Victorian Branch, B.M.A.: Council Meeting.
MAR. 24.—Queensland Branch, B.M.A.: Council Meeting.
MAR. 28.—New South Wales Branch, B.M.A.: Council Quarterly.
MAR. 30.—New South Wales Branch, B.M.A.: Annual Meeting.
MAR. 30.—South Australian Branch, B.M.A.: Branch Meeting.
APR. 4.—New South Wales Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135 Macquarie Street, Sydney): Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester United Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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